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2015 Evaluation of Northwest Atlantic Fisheries Organization (NAFO) Divisions 4VWX Herring

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Foreword

This series documents the scientific basis for the evaluation of aquatic resources and ecosystems in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

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ABSTRACT

The 2015 evaluation of the Northwest Atlantic Fisheries Organization (NAFO) Divisions 4VWX herring considered the data from the 2012-2013 and 2013-2014 quota years. Quota landings of Atlantic Herring (*Clupea harengus*) in 2012-2013 were 46,554 tonne (t) and in 2013-2014 were 50,250t against a Total Allowable Catch of 50,000t for each quota year for the Southwest Nova Scotia/Bay of Fundy (SWNS/BoF) component. Acoustic biomass estimates decreased by 28% in 2013 followed by a 37% increase in 2014 for the SWNS/BoF stock component. In 2014, the SWNS/BoF stock component biomass estimate was slightly above the long term average. It is evident that most of the recent fluctuation in the SWNS/BoF spawning complex is occurring in the Scots Bay area despite an industry imposed catch restriction in the area. In 2013, the fishery catch at age composition by number was comprised of 34% fish at age 2, 21% fish at age 3, 9% at age 4, and 22% at ages 5+. In 2014, the fishery catch at age composition by number was comprised of 30% fish at age 2, 29% at age 3, 12% at age 4, and 21% at ages 5+. In 2013 and 2014, the proportion of the catch age 5+ is the second and third highest proportion of ages 5+ caught since 1994.

Landings from the Offshore Scotian Shelf banks areas continued the downward trend that began in 2012, with landings of only 1,515t in 2013 and 58t in 2014. There were only limited landings of herring from the bottom trawl and mid-water trawl (only 2014) gear in the Offshore Scotian Shelf banks areas for 2013 and 2014. No acoustic survey was completed for the offshore area in 2013 and 2014. Herring abundance in the 2013 and 2014 summer bottom trawl research vessel survey remained relatively consistent with the survey results since 2011. The overall 4VWX area showed an increase in abundance from 2012 to 2013, followed by a subsequent decrease in 2014. This survey has not been considered indicative of overall abundance due to changes in catchability for herring and a lack of year-class tracking.

The recorded landings in the gillnet and trap net fisheries along the coast of Nova Scotia increased from 3,007t in 2012 to 3,937t in 2013 and to 4,760t in 2014. There was a large increase in the surveyed acoustic biomass in the Halifax/Eastern Shore area from an historic low estimate in 2012 of 3,668t, to 6,870t in 2013, and again in 2014 to 9,586t, which is near the five-year average of 10,664t. In the Little Hope area, there was an increase in 2013 to 74,532t from the four-year low in 2012 of 12,756t. The surveyed biomass in the Little Hope/Port Mouton area decreased to 46,077t in 2014, but is still above the five-year average of 37,664t. Only one survey was completed near Glace Bay in 2013 (50t) and none were completed in 2014. In the Glace Bay area, minimal landings of 2t and 1t were reported in 2013 and 2014, respectively. No herring surveys took place in the Bras d'Or Lakes.

Landings in the New Brunswick weir and shut-off fishery were at a historic low of 504t in 2012. Landings increased to 6,431t in 2013 and then decreased to 2,149t in 2014, the second lowest landings for this fishery since 1963. In 2007, landings were 30,944t, the highest in nearly 20 years. The age distribution of fish caught in the New Brunswick weir and shutoff fishery were primarily juveniles, with 93% (2013) and 96% (2014) by numbers at either age 1 or age 2. The success of this passive trap fishery has been historically unpredictable and landings have declined markedly from the 1980s to present. Landings may not be indicative of abundance because catches are extremely susceptible to many factors in addition to abundance, including effort.

Évaluation des stocks de hareng des divisions 4VWX de l'Organisation des pêches de l'Atlantique Nord-Ouest (OPANO) en 2015

RÉSUMÉ

L'évaluation des stocks de hareng des divisions 4VWX de l'Organisation des pêches de l'Atlantique Nord-Ouest (OPANO) en 2015 portait sur les données des années de quota 2012-2013 et 2013-2014. Les quotas de débarquements du hareng de l'Atlantique (*Clupea harengus*) se chiffraient à 46 554 tonnes (t) en 2012-2013 et à 50 250 t en 2013-2014, par rapport à un total autorisé des captures de 50 000 t par année de quota pour la composante du sud-ouest de la Nouvelle-Écosse et de la baie de Fundy. Les estimations de la biomasse de cette composante du stock dans les relevés acoustiques ont diminué de 28 % en 2013, puis ont connu une augmentation de 37 % en 2014. En 2014, l'estimation de la biomasse de la composante du stock du sud-ouest de la Nouvelle-Écosse et de la baie de Fundy était légèrement au-dessus de la moyenne à long terme. Il est évident que la plupart des récentes fluctuations dans ce complexe de stock ont lieu dans la zone de la baie Scots malgré une restriction des prises imposée par l'industrie dans la zone. Voici la composition des prises (par nombre) selon l'âge en 2013 : 34 % de poissons d'âge 2, 21 % de poissons d'âge 3, 9 % de poissons d'âge 4, et 22 % de poissons d'âges 5+. Voici la composition des prises (par nombre) selon l'âge en 2014 : 30 % de poissons d'âge 2, 29 % de poissons d'âge 3, 12 % de poissons d'âge 4, et 21 % de poissons d'âges 5+. En 2013 et en 2014, la proportion des prises de poissons d'âges 5+ représentait la deuxième et la troisième plus grande proportion de poissons de ce groupe d'âge capturés depuis 1994.

Les débarquements des zones des bancs extracôtiers du plateau néo-écossais continuent de suivre la tendance à la baisse qui a commencé en 2012; les débarquements étaient seulement de 1 515 t en 2013 et de 58 t en 2014. Il y a eu peu de débarquements de harengs capturés par chalut de fond et par chalut pélagique (seulement 2 014) dans les zones des bancs extracôtiers du plateau néo-écossais en 2013 et 2014. Aucun relevé acoustique n'a été effectué pour la zone extracôtière en 2013 ou 2014. L'abondance du hareng dans les relevés par navire de recherche au chalut de fond effectués durant les étés 2013 et 2014 est demeurée relativement conforme aux résultats du relevé depuis 2011. Dans l'ensemble, les divisions 4VWX ont connu une augmentation de l'abondance de 2012 à 2013, puis une diminution en 2014. Ce relevé n'a pas été considéré comme un indicateur de l'abondance globale en raison des variations de la capturabilité du hareng et du manque de suivi de la classe d'âge.

Les débarquements enregistrés pour la pêche au filet-trappe et au filet maillant le long de la côte de la Nouvelle-Écosse ont augmenté de 3 007 t en 2012 à 3 937 t en 2013 et à 4 760 t en 2014. Il y a eu une augmentation importante de la biomasse dans les relevés acoustiques menés dans la région de Halifax et de la côte est; elle est passée d'un creux historique de l'estimation de 3 668 t en 2012 à 6 870 t en 2013, puis à 9 586 t en 2014, un chiffre près de la moyenne sur cinq ans (10 664 t). Dans la région de Little Hope, elle est passée du creux historique sur quatre ans de 12 756 t en 2012 à 74 532 t en 2013. La biomasse dans le relevé mené dans la région de Little Hope et de Port Mouton a diminué et est passée à 46 077 t en 2014, mais ce chiffre est toujours au-dessus de la moyenne sur cinq ans de 37 664 t. Un seul relevé a été effectué près de Glace Bay en 2013 (50 t), tandis qu'aucun relevé n'a été effectué dans cette région en 2014. Dans la région de Glace Bay, un faible nombre de débarquements ont été signalés, soit 2 t et 1 t en 2013 et 2014, respectivement. Il n'y a pas eu de relevé sur le hareng dans les lacs Bras d'Or.

Les débarquements provenant de parcs à hareng et de sennes de plage au Nouveau Brunswick ont atteint un niveau historiquement bas de 504 t en 2012. Les débarquements ont augmenté à 6 431 t en 2013; ils ont ensuite diminué à 2 149 t en 2014, le second niveau le plus bas dans cette pêche depuis 1963. En 2007, les débarquements se chiffraient à 30 944 t, soit le niveau le

plus élevé depuis presque 20 ans. D'après la répartition selon l'âge, les poissons pêchés dans des parcs à hareng et des sennes de plage étaient principalement des juvéniles; 93 % (2013) et 96 % (2014), par nombre, étaient d'âge 1 ou 2. Le succès de cette pêche passive au casier est historiquement imprévisible, et les débarquements diminuent de façon marquée depuis les années 1980. Les débarquements ne sont pas nécessairement représentatifs de l'abondance, car les prises sont extrêmement sensibles à de nombreux facteurs en plus de l'abondance, y compris les efforts.

INTRODUCTION

Atlantic Herring (*Clupea harengus*) is a pelagic species found on both sides of the North Atlantic. Herring spawn in discrete locations, to which they are presumed to home. Herring mature and spawn at three to four years of age (23-28cm or 9-11in in length), then begin a predictable annual pattern of spawning, over wintering, and summer feeding, which often involves considerable migration and mixing with members of other spawning groups. Fishing primarily occurs on dense summer feeding, over wintering, and spawning aggregations, and has been dominated by purse seine, weir, and gillnet gear types, with relatively minor landings by shutoff, trap, and mid-water trawl.

The Northwest Atlantic Fisheries Organization (NAFO) 4VWX management unit contains a number of spawning areas, separated to various degrees in space and time. Spawning areas in close proximity, with similar spawning times, and which share a larval distribution area, are considered part of the same component. Some spawning areas are large and offshore, whereas others are small and more localized, sometimes near shore or in small embayments. The situation is complicated further as herring migrate long distances and mix outside of the spawning period, both with members considered part of the same component and with members of other components. For the purposes of evaluation and management, the 4VWX herring fisheries are divided into four components (Figure 1):

1) Southwest Nova Scotia/Bay of Fundy (SWNS/BoF) spawning component (also '4WX' in management plan);
2) Offshore Scotian Shelf banks spawning component;
3) Coastal (South Shore, Eastern Shore and Cape Breton) Nova Scotia spawning component; and
4) Southwest New Brunswick (SWNB) migrant juveniles.

Each component has several spawning areas, and there is mixing of fish among spawning components. Industry and Fisheries and Oceans Canada (DFO) have explored means of managing the complexity within each component (e.g. distributing fishing effort among spawning areas according to their relative size) and accounting for interaction among components (e.g. fishing restrictions on some areas of mixing).

The Georges Bank spawning component is not included in this evaluation except to document Canadian fishing activity. There were no herring landings in 2013 and 2014 from the Canadian portion of Georges Bank, with the last recorded landings observed in 2004. This fishery is included in the Gulf of Maine stock complex and was evaluated in 2009 (DFO 2003a; TRAC 2009) and 2012 (Northeast Fisheries Science Center 2012).

OBJECTIVES AND MANAGEMENT

The 2003 (Evergreen) Scotia-Fundy Herring Integrated Fisheries Management Plan (IFMP) states the principles, conditions, and management measures for the 4VWX herring fisheries (DFO 2003b). The main principle stated in the plan is "the conservation of the herring resource and the preservation of all of its spawning components". The background for the conservation objectives was first developed and reviewed (Sinclair 1997).

Three conservation objectives appear in the plan:

1. To maintain the reproductive capacity of herring in each management unit. Targets include:
    - persistence of all spawning components in the management unit;
    - maintain biomass of each spawning component above a minimum threshold;

- maintain a broad age composition for each spawning component; and
- maintain a long spawning period for each spawning component.

2. To prevent growth overfishing:
    - continue to strive for fishing mortality at or below $F_{0.1}$.
3. To maintain ecosystem integrity/ecological relationships ("ecosystem balance"). Herring is prominent in the diet of many fish, birds and marine mammals and should be managed with these interactions in mind. Specific targets include:
    - maintain spatial and temporal diversity of spawning; and
    - maintain herring biomass at moderate to high levels.

There is evidence that some of these conservation objectives are not being met; however, there has been some improvement from the low level of the spawning stock biomass (SSB[1]) estimates noted in recent assessments (Power et al. 2006, 2007, 2008, 2010a, 2013; Singh et al. 2014a). These objectives require better definition in terms of minimum thresholds and should explicitly list the spawning components in terms of spatial and temporal expectations.

An "in-season" management process, first implemented in the SWNS/BoF fishery during 1995, continues to be used widely within the 4VWX management area (DFO 1997; Stephenson et al. 1996, 1999). The approach encourages surveying using the commercial fleet under scientific direction prior to fishing ("survey, assess, then fish" protocol) to ensure that effort is distributed appropriately among various components of the stock (particularly among spawning components) according to the relative size and current state of each component. The use of this approach in recent years has improved data collection and enabled management decisions to be modified through the involvement of participants and on the basis of up-to-date information.

Collaborative research efforts with the fishing industry have been important in recent years. A major portion of the herring industry (including the purse seine sector and major processors that form the Herring Science Council (HSC) and members of the fixed gear sector) has undertaken a separate Joint Project Agreement with DFO to conduct collaborative scientific projects. The herring industry continues to collect samples and conduct biological sampling, while purse seine and gillnet sectors conducted key acoustic surveys. In 2013 and 2014, field activities were supervised by the HSC manager with assistance from St. Andrews Biological Station (SABS)/DFO staff, individual survey vessel captains, and plant managers. In addition, downloading and data editing services were contracted by the HSC through A. Clay from Femto Electronics Ltd, Lower Sackville, Nova Scotia.

SOUTHWEST NOVA SCOTIA/BAY OF FUNDY SPAWNING COMPONENT

THE FISHERY

In recent years, the herring fisheries in the 4VWX area have been dominated by purse seine, weir, and gillnet, with relatively minor landings by shutoff, and trap. A variety of herring fishing locations, NAFO areas, and fishing ground areas are used to describe fishing activities and group the data for landings and sampling analysis (Figures 2 to 4).

Quota landings for the SWNS/BoF stock component, the only component under a Total

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[1] Throughout this document spawning stock biomass (SSB) refers to the spawning stock biomass observed at the time of the acoustic surveys.

Allowable Catch (TAC) control, were 46,554 tonne (t) against a TAC of 50,000t for 2012-2013 quota year. In 2013-2014, landings were 50,250t against a TAC of 50,000t. The quota year begins on October 15th and ends on October 15th of the following year. Landings in the fall 2013 purse seine fisheries for the 2013-2014 quota year were 1,460t. The fall 2014 purse seine fisheries for the 2014-2015 quota year were 1,291t. There was no winter fishery in 2013 or 2014. There were additional landings of 11,778t (2013) and 6,966t (2014) from the non-stock components including Coastal Nova Scotia, the Offshore Scotian Shelf Banks, and SWNB Migrant Juveniles. The landings from New Brunswick weirs and shutoffs fisheries increased from 504t in 2012 to 6,431t in 2013, before decreasing to 2,149t in 2014. Landings from the Coastal Nova Scotia gillnet fisheries also increased from 3,007t in 2012 to 3,937t in 2013 and again in 2014 to 4,760t. The landings from the Offshore Scotian Shelf Banks component increased from 1,255t in 2012 to 1,515t in 2013, before decreasing to a historical low of 58t in 2014 (Tables 1A, 1B, 2A, 2B and 3).

Landings for SWNS/BoF stock component have recently tracked the TAC, with most of the quota (and on occasion slightly above) being taken each year since 2002 (Figure 5). In the 2012-2013 quota year, landings were 3,446t below the TAC. In 2013-2014 landings were 250t above the TAC. As a result of the reduced quota since 2005, total landings from this component have remained low (Table 3). Tables 4A and 4B provide the purse seine landings (in tonnes and in percentages) by fishing grounds from 1985-2014 for the 4WX stock component. Throughout the history of this fishery most landings have been caught by purse seine gear, with the 4X summer purse seine fishery being the largest (Table 3; Figures 6, 7A and 7B). Landings by the purse seine sector accounted for 97% and 95% of the component landings in 2013 and 2014, respectively, with minimal landings by the gillnet sector (higher than in recent years; 1,270t in 2013 and 2,102t in 2014) and continuing a below average trend in landings from the Nova Scotia weirs (43t in 2013 and 166t in 2014; Tables 1A and 1B, respectively). According to the IFMP, 80% of the TAC is initially allocated to the mobile gear sector and 20% to the fixed gear sector and, as in past years, a transfer of unused quota to the mobile fleet occurred near the end of the fishing season.

Purse seine landings are summarized by fishing grounds using definitions of the various grounds based on groupings of 10-minute boxes of latitude and longitude (Tables 4A, and 4B; Figure 4). The largest proportions of landings came from fishing grounds in the German Bank (29% in 2013, 30% in 2014), Grand Manan (27% in 2013; 20% in 2014) and Gannet Dry Ledge (13% in 2013; 26% in 2014) areas (Table 4B; Figure 8). The purse seine landings from fishing grounds in the Gannet Dry Ledge area in 2014 were their highest proportion to date, although not by landing tonnage (12,659t in 2014 compared to 18,527t in 1992, Tables 4A and 4B). Scots Bay landings decreased from 11% in 2012 to 10% in 2013 and 9% in 2014. Landings from Scots Bay have decreased each year since 2011 (5,130t) to 2014 (4,498t). Landings from the New Brunswick coastal area increased from the 17-year low in 2012 of 132t to 1,760t in 2013 before decreasing again in 2014 to 557t. Landings were again below the long term average from the Long Island and Trinity Ledge areas. Landings from the Long Island area increased significantly from 2012 (160t) to 4,942t in 2013, but decreased in 2014 to 2,607t. In comparison, landings from the Lurcher area continue to be above the long-term average of 1,581t in both 2013 (2,872t) and 2014 (2,134t).

Purse seine landings of 1,460t were reported in the October/November 2013 fall fishery and 1,291t were reported in the October/November 2014 fall fishery (Tables 2A and 2B; Figures 9A and 9B). There was no winter fishery reported in 2013 or 2014 (Tables 1A and 1B). Fisheries that occur at the beginning of each quota year are usually concentrated on the New Brunswick side of the Bay of Fundy.

The largest single fishery of the SWNS/BoF stock component is the summer purse seine fishery, which occurs from May to October in the Bay of Fundy area. In 2013, this fishery occurred in similar areas and months as in previous years with total landings of 44,884t (Table 1A; Figure 10A). The 2014 fishery took place in similar areas and months with total landings of 46,522t (Table 1B; Figure 10B). A large portion of this fishery is directed toward pre-spawning, feeding aggregations in May and June. Landings on the major spawning grounds during the spawning period in Scots Bay and on German Bank are found primarily within the pre-defined acoustic survey areas (Melvin and Power 1999).

As in recent years, there was no winter fishery in Chedabucto Bay and the majority of the fall herring landings came from the New Brunswick side of the Bay of Fundy (Table 4A; Figures 9A and 9B).

Landings of non-stock component herring by purse seine, which occurred solely from the Offshore banks area on the Scotian Shelf in 2013 and 2014, increased from 1,210t in 2012 to 1,466t in 2013 (Table 5; see: Figures 38A and 38B). In 2014, landings of non-stock component herring by purse seine were at a 25-year low of 23t. There have been no landings from the Georges Bank, Liverpool, Shelburne and Halifax areas since 2006. In 2013 and 2014, there were also no landings from the Western Hole area (Table 5).

Main Fishing Areas for the SWNS/BoF Component

The main fishing areas for the SWNS/BoF component are the German Bank, Scots Bay, and Trinity Ledge areas, which also include spawning grounds fisheries. Additional amounts of fishing occur in the Gannet Dry Ledge, Grand Manan and Long Island Shore stock areas. Recently, only limited fishing has been occurring by the Nova Scotia weirs in St. Mary's Bay, although some weir landings are now being reported in the upper Bay of Fundy near Parrsboro. In the past, there was also an occasional small gillnet fishery in the spring on spawning herring near Spectacle Buoy, which is just southeast of Yarmouth, Nova Scotia; however, there has been no reported landings from this area since 2011. Last, there has been a new trend of increasing gillnet landings in Scots Bay and German Bank, areas previously not fished by the gillnet fleet (Table 6).

German Bank

German Bank is one of the primary herring fishing grounds in the Bay of Fundy area. In recent years, there has been a trend of increasing gillnet landings from German Bank (Table 6). Since 1985, landings from this area have ranged from 9,003-35,977t during the main fishery period from early-May to late-October (Table 7). Purse seine landings during the pre-spawning period (defined as the period from January 1st to August 14th) increased from 5,369t in 2012 to 6,324t in 2013 and 15,077t in 2014. The 2014 pre-spawning period landings are near to the highest landings since 1985, which were 18,508t in 1999 and 16,845 in 2008 (Table 7). Purse seine and gillnet landings during the spawning period (defined as the period from August 15th to October 15th) decreased from 29,582t in 2012 to 12,700t in 2013 and to 10,080t in 2014. The contribution of German Bank landings to the overall TAC decreased from 70% in 2012 to 38% in 2013 before increasing again up to 50% in 2014 (Table 7; Figure 11).

The distribution of catches (purse seines only) on German Bank in the 2013 and 2014 pre-spawning period (January 1st to August 14th) are presented in Figure 12. Within the spawning box area, catches on German Bank during the spawning period are primarily of spawning "roe" fish (Figure 13). However, immature juvenile herring were collected in the spawning box area by the Canadian Coast Guard Ship (CCGS) *Alfred Needler* between July 29th and August 14th in 2013. Similarly, in 2014, there was a high percentage of Stage 1-2 "immature" fish and herring of less than 23cm in length collected by the CCGS *Alfred Needler* between May 14th and August 4th. In 2013 and 2014, catches of spawning herring were generally spread within the 'strata box' (which is used as the primary search area in acoustic surveys), with localized groups seen in both the northern and southern portions (Figure 13). In 2013, the catches of spawning herring extended farther south than in the previous year, extending outside of the standard survey area. In comparison, in 2014 the catch was again predominantly localized within the 'strata box', with less of a north-south division in the catches. As in 2012, the fishery catches during the spawning period in 2013 occurred throughout August to October, with the majority occurring between mid-August and mid-October. In 2014, however, the catches shifted significantly earlier, occurring predominantly in August and tapering off in September (Figure 14). The total landings for the German Bank area decreased to 19,025t in 2013, from the near high of 34,951t in 2012, before increasing in 2014 to 25,157t in 2014 (Table 7). The timing and amount of the landings on German Bank may also be influenced by industry measures to limit catches to less than 50% of the TAC on the German Bank fishing ground.

Scots Bay

The Scots Bay herring purse seine fishery has been an important component of the summer fishery. Since 1987, landings have ranged from 902t in 2009 to 24,388t in 2004 during the period of late-June to late-August/early-September (Table 8; Figure 15). The earliest catch dates for the Scots Bay herring purse seine fishery occurred in 2013 and 2014 (Table 8). Since 2006, the Scots Bay fishery has been restricted by a 5000t cap self-imposed by the herring industry due to the poor performance of the spawning component. The highest recorded landings of 24,388t, and the most days with catch recorded, occurred in 2004 (Table 8). Landings in 2013 and 2014 continued the decreasing trend since 2011 (5093t). In 2013, the Scots Bay herring purse seine landings were 4,702t (over a 71-day fishing period) and 4,498t (over a 71-day fishing period in 2014) (Table 8; Figure 16). Most of the catches in 2013 and 2014 were located within the defined survey box area. Substantial catches also occurred outside the box either in Advocate Bay or into the upper part of Scots Bay, predominantly in 2013 (Figure 16). The catches were spread throughout the season in both 2013 and 2014 (Figure 17).

Trinity Ledge

In this report, the stock gillnet landings were re-analyzed such that now Table 9 presents the landed weight within the Trinity Ledge survey area and the exploitation percentage of the acoustic surveyed biomass. Landings within the Trinity Ledge survey area decreased from 177t in 2012 to 99t in 2013 (between August 13th to September 18th) and increased to 123t in 2014 (between August 12th and September 30th) (Table 9; Figures 18A, 18B and 19). In 2013, the total estimated biomass (with the Calibration Integration Factor, or CIF) from the acoustic surveys followed a similar pattern, decreasing to 950t in 2013 from 2,754t in 2012 and increasing to 4,772t in 2014 (Table 9; Figure 19). The exploitation rate was at its highest percentage since 2007 in 2013 (10%; Table 9). Additional work is required to monitor the status of this spawning area, which once supported a major portion of the overall stock landings (Tables 4A and 4B; Figure 8).

Nova Scotia Weirs

Landings from Nova Scotia weirs (4Xr) located in the Bay of Fundy near Parrsboro, Nova Scotia, remained quite low at only 43t in 2013 and 166t in 2014 (Tables 3 and 10; Figure 20). There has also been a decline in the total number of herring weirs to 14 active weirs in the last decade, down from 20 or more in the 1980s, with only three reporting catches in 2013 and 2014 (Table 11). In 2011-2012, the seasonal timing of the Nova Scotia weir landings was noted to have shifted to the later months of the season, with most of the catch in July, August, and September (Table 10). However, in 2013 and 2014, the catches were earlier in the year. There were no herring weir landings in August or September in either 2013 or 2014 and, in 2014, all herring weir landings occurred in May and June. Landings for the Nova Scotia weirs have been highly-variable in recent years and are not consistent in amount or timing, with catches occurring early in the season in the 1990s and then later in the season over the last decade.

Spectacle Buoy

In the past, the spring gillnet fishery for roe has occurred for a short period in June in the vicinity of Spectacle Buoy located southeast of Yarmouth, Nova Scotia. The fishery is dependent on fish availability and to some extent market conditions, and may or may not occur in any given year. In 2008, only one landing of 6t was reported and very limited acoustic surveys were completed. In 2009, there was little fishing (less than 1t) and no survey activity in this area, while in 2010 there was no fishing and a survey biomass of 1,859t based on two properly conducted surveys. In 2011, only 1t catch was reported with an estimated survey biomass of 282t from one properly conducted survey. There was no fishery or surveys conducted in 2012 to 2014 (Table 9).

RESOURCE STATUS

Commercial Catch Rate Indices

Catch and effort for gillnet data in the SWNS/BoF spawning component have been examined in previous assessments. The data indicated little trend and were considered unrepresentative due to the small amounts and variable timing and location of catch and effort (Power et al. 2004) (Table 3). The 2013 landings from the gillnet fishery in the SWNS/BoF spawning component increased from 471t in 2012 to 1,270t in 2013 and again to 2,102t in 2014 (Table 3).

Purse seine landings comprise the majority of the overall landings and are allocated 80% of the TAC for the SWNS/BoF component under the current IFMP. The purse seine landings have fluctuated between 44,476t and 103,537t since 1989, primarily reflecting changes in the TAC (Table 12; Figure 21). The number of boats fishing and days fished has dropped since 1990 due to fleet rationalization. This has resulted in increases in landings per boat and catch per day in recent years, but the landings are also affected by the reduced TAC. In general, purse seine catch rates are not considered to reflect trends in population abundance due to the nature of herring schooling behavior and the acoustic technology used to find these concentrated schools. Catch rates can remain high or stable even at low stock levels. These data are reported to document the overall effort by the purse seine fleet (Table 12).

Acoustic Surveys

Automated acoustic recording systems deployed on commercial fishing vessels have been used since 1997 to document the distribution and abundance of herring. Scheduled surveys are now conducted annually with surveys completed every two weeks on each of the main spawning components. An index of SSB is estimated by summing these results (Melvin and Power 1999). Throughout this document SSB refers to the spawning stock biomass observed at the time of the acoustic surveys.

The 2008 biomass estimate in the traditional survey areas of Scots Bay, Trinity Ledge and German Bank (264,900t) was the lowest recorded since acoustic surveys began in 1997. Since 1999, the total SSB has fluctuated between 264,900t and 576,700t. The estimates in 2011 and 2012 tended upwards (448,8001t in 2011 and 476,000t in 2012) being at or above the long term average. This represents an increase of 44% from 2010 to 2011 and an increase of 16% from 2011 to 2012. In the last two years, a substantial decrease in the overall SWNS/BoF stock biomass estimate was observed in 2013 (341,694t, 95% confidence interval (C.I.): +/-160,115t), with the estimate returning to slightly above the long term average in 2014 (468,736t, 95% C.I.: +/-185,679t). It is evident that most of the recent fluctuation in the SWNS/BoF spawning biomass is occurring in the Scots Bay area, although industry has imposed a catch restriction of 5,000t in Scots Bay since 2006. Caution should also be observed in the German Bank area as a result of a trending decline over the previous four years in the estimated biomass for this area (Table 13; Figures 22 and 23).

Spawning Ground Turnover Rates from Tagging Studies

The current acoustic survey methodology on spawning grounds is dependent on the periodic turnover of spawning fish. Acoustic surveys are required to be separated by 10 to 14 days to allow for fish turnover and to prevent double counting (Power et al. 2002). Melvin et al. (2014) updated the tagging study on German Bank during the spawning period that was completed in 2011. Approximately 23,000 spawning herring were marked and released on German Bank during the 2009-2011 spawning season. This data was combined with data from previous Scots Bay and German Bank tagging studies for analysis. Overall, 13% of tagged fish in Scots Bay and 19% on German Bank were recaptured after two weeks. Regression analysis indicates a strong relationship between the days at large and the proportion of fish remaining on the bank. Corrections for the 2012 Scots Bay and German Bank spawning biomass for elapsed time reduced the biomass from 397,590t to 308,069t, or by 22.5%. A review of this study and its results should be conducted at the next framework review of 4VWX herring, as well as, if and how this data should be incorporated into the assessment. Incorporation will require that adjustments also be made to the reference points that utilize acoustic biomass estimates.

Exploitation Rates on Spawning Grounds

The acoustic survey estimates and landings from individual spawning areas were examined to estimate relative exploitation rates on different spawning groups and the overall SWNS/BoF component. Exploitation was calculated as the ratio of landings divided by acoustic survey biomass. These estimates can be used to assess the impact of fishing and also to estimate the relative size of individual spawning units within the SWNS/BoF component. These rates are dependent on the assumptions that the acoustic survey SSB is complete, that catches have been properly allocated and, most critically, that the acoustic SSB provides an absolute measure of biomass. As a result of these uncertainties, the absolute fishing mortalities cannot be determined or inferred, but instead the trends over time may be used in a relative sense from year-to-year.

For this analysis, as in previous years (Singh et al. 2014b), the three main spawning areas of Scots Bay, German Bank, and Trinity Ledge, which have received relatively consistent survey effort since 1999, were used (Table 14-A1). The acoustic SSB for nearby Seal Island and Spectacle Buoy areas were allocated to the German Bank spawning area. All catches captured on each spawning ground throughout the year were assumed to be site specific (Table 14-C1), while landings from other non-spawning areas were allocated based on the relative spawning ground SSB proportions from annual acoustic surveys (Table 14-A2). The adjusted total landings were thus made equal to the reported stock landings (Table 14-C2). Exploitation rates were then calculated (Landings/SSB) for both the actual landings from the spawning grounds and the overall adjusted landings as proportions (Table 14-E1, E2).

The trends in spawning area proportions estimated from acoustic surveys (Table 14-A2) were stable between 2005 and 2010, with approximately 80-90% of surveyed SSB found in the German Bank area and 10-20% in the Scots Bay area; however, those proportions have changed dramatically since 2011. On German Bank, the proportions are below average and varied between 50% (2014) and 77% (2013), while in Scots Bay the proportions were above average and varied between 22% (2013) and 49% (2014) (Table 14-A2).

Since 1999, calculation of exploitation rates by areas (Table 14-E2) indicated that larger areas (Scots Bay and German Bank) have an average exploitation rate of 18% and 15%, respectively, while the smaller area (Trinity Ledge) had an average exploitation rate of 55%. The combined overall adjusted exploitation rate for these three areas ranged from 10-25% from 1999 to 2014 (Figure 24). These exploitation rates are useful for year-to-year comparisons and indicate that the overall adjusted estimate was stable from 14-18% between 1999 and 2004. There was an increase in the overall adjusted exploitation rate to 21% in 2005, coinciding with a large decrease in total survey biomass. The rate declined to 13% in 2007 followed by an increase to the series high of 25% in 2008. From 2009 to 2012, the rate declined from 14% to 10%, increasing up to 18% in 2010. In 2013, the overall adjusted exploitation rate increased again to 14% and decreased in 2014 to 11% (Table 14-E2; Figure 24).

Biological Sampling

Comprehensive biological sampling continued for this fishery with substantial involvement of the fishing industry, which provided length frequencies, maturity reports, and frozen fish samples for analysis by DFO personnel. In 2013, a total of 1,947 samples (329,054 fish) were measured for length, while 4,455 fish were sampled for sex, weight, maturity and age (Table 15A). In 2014, a total of 1,748 samples (287,492 fish) were measured for length, while 5,761 fish were sampled for sex, weight, maturity, and age (Table 15B). The sources of the samples are provided in Table 16, with the majority supplied by the processing industry since 1996. Additional samples were collected by DFO personnel, observers deployed on fishing vessels, and DFO research surveys. Sampling from the commercial fishery coincided with the spatial and temporal distribution of the fishery, and additional sampling from research vessel surveys during the spring and summer resulted in widespread geographic coverage as in the past (Figures 25A and 25B).

Catch at Age

Consistent with previous assessments, the catch at length and age were constructed using the ‘Catch at Age’ application (version 11.5), a program that computes catch at age statistics as part of the stock assessment process. Data files used by ‘Catch at Age’ were selected directly from biological sample data in the Pelagic Samples Database, Maritimes Region, DFO. These data included a 2% adjustment for the shrinkage due to freezing on the length measurements for frozen samples (Hunt et al. 1986).

The size and age composition was characterized by month, unit area, and gear type using all available length and age samples in 2013 (Table 17A) and 2014 (Table 17B). The required length-weight relationships were calculated on a monthly basis. The catch at age statistics were calculated from length frequency and age-length samples expanded to total landings using appropriate monthly length-weight relationships. The data were grouped and age-length keys were applied to length frequencies to produce catch at age statistics by NAFO unit area, gear-type and month.

Tables 18A and 18B and Figures 26A and 26B present monthly and seasonal catch at age data for the 2013 and 2014 summer purse seine fishery conducted on the SWNS/BoF spawning component (4WX stock). The monthly purse seine catch at age (Tables 18A and 18B, Figures 26A and 26B) during 2013 and 2014 indicate that catches later in the season tend to consist of larger percentages of younger fish (ages 2 and 3). This is a concern since younger fish would not yet have contributed to spawning. Tables 19A and 19B and Figures 27A and 27B present catch at age by fishing ground for the 2013 and 2014 summer purse seine fishery conducted on the SWNS/BoF spawning component (4WX stock). Table 20A presents the catch at age data for the 2011-2012 for the purse seine, gillnet, and weir fisheries conducted on the SWNS/BoF spawning component (4WX stock). Tables 20B and 20D and Figures 28A and 28B present the catch at age data for the 2012-2013 and 2013-2014 quota years for the purse seine, gillnet, and weir fisheries conducted on the SWNS/BoF spawning component (4WX stock). Tables 20C and 20E present the comparisons of herring catch at age for 2011-2012 versus 2012-2013 quota years (Table 20C) and 2012-2013 versus 2013-2014 quota years (Table 20E).

The 2013 catch was dominated by the 2012 year-class (at age 2), representing approximately 34% by number. The 2011 year-class (at age 3) was the second most important by number at 21%. The 2013 catch by weight of the herring landed was spread equally (17- 21%) across four year-classes: at age 2 (2012), age 3 (2011), age 5 (2009), and age 6 (2008) (Table 21B;Figure

29A). The proportion of the catch older than age 5 increased in 2013 to 21% (by numbers) from 14% in 2012 (Tables 20A and 20B). The total number of fish of all ages removed by the fishery in 2013 was calculated to be 429 million, a decrease of 3.5 million (or 1%) from 2012.

In the 2014 landings, the 2013 and 2012 year-class (at age 2 and 3, respectively) represented approximately 30% and 29%, respectively, of the numbers of herring landed in the SWNS/BoF component (Tables 20D and 21B; Figure 29B). These large percentages of age 2 and 3 herring in the landings is a concern since they would not have had a chance to contribute to spawning. Industry has implemented measures to monitor catch size distribution and to limit the amount of small fish landed. By weight, the 2012 year-class (at age 3) represented 25% of the herring landed in the SWNS/BoF component. The second most important age class by weight was the 2009 year-class (age 6). The proportion of the catch older than age 5 increased in 2014 to 22% (by numbers) from 21% in 2013. The total number of fish of all ages removed by the fishery in 2014 was calculated to be 448 million, an increase of 19.7 million or 5% from 2013.

The number of age 2 fish decreased from 34% in 2013 to 30% in 2014 (Figures 29A and 29B). Most of this decrease is a result of decreased catches in the Grand Manan and Long Island Shores areas, which are dominated by age 2 fish. The number of age 3 fish increased from 21% in 2013 to 29% in 2014. Most of that increase is a result of increases in catches on Grand Manan Banks and Gannet Dry Ledges areas, where the percentage of age 3 fish is similar between years. Despite an overall decrease in age 2 fish caught in 2014 compared to 2013, most of the stock fishing grounds showed increases in the proportion of age 2 fish caught.

The historical time series of catch at age data indicates there have been few fish older than age 8 since 1995 and this time series continues to be dominated by ages 2-5 (Tables 21A and 21B; Figure 30). Older ages had been a feature when strong year-classes (i.e. 1976 and 1983) were progressing through the fishery. These stronger year-classes had persisted in the catch to older ages in the 1970s through to early-1990s. In recent years, the rapid decline of year-classes in the landings and the continued lack of older fish imply a high total mortality (Power et al. 2006). The trend toward catches at younger ages results in reduced yield and is reflected in the increase in the number of individual fish caught as the landings have decreased (Figure 31). In 2013 and 2014, the proportion of the catch at age 5+ was 21% and 22% (by numbers), respectively, representing the second and third highest proportion of age 5+ fish caught since 1994 (25% in 2007).

Weight at Age

The average (fishery weighted) weight at age continues to be below the long term 1965-2014 average, possibly reflecting changes in fishing patterns and timing (Table 22; Figure 32). There was a general decline in weight at age that occurred for all ages around 1987 (Figure 33). A further decline is also apparent for older ages (6 to 10) after 1997, with ages 8+ fish now consistently below 300g. Consistent with the data for 2012 in the previous assessment (Singh et al. 2014a), the 2013 and 2014 weights at age in particular are similar to the most recent five-year and ten-year averages, which are consistently less than the overall time series average (Figure 32).

Total Mortality Estimates from Acoustic Data

Estimates of total mortality (Z = Fishing mortality (F) + Natural mortality (M)) were calculated using the acoustic catch at age data. When completed in this manner, Z calculations are typically quite variable, but can often be used to detect broad patterns. Total mortality was calculated using ages 4 to 8 combined compared with ages 5 to 9 in the following year (overall SWNS/BoF component: Table 23A; Figure 34A, German Bank: Table 23B; Figure 34B and Scots Bay: Table 23C; Figure 34C). The acoustic age composition from 1999 to 2014, and the biological characteristics from sampling from 1999 to 2014, are shown in Table 24 for the overall SWNS/BoF component (A), German Bank (B), and Scots Bay (C). The results for 2000 to 2014 have highly variable Z values, ranging from: -0.3 to 1.3 for the overall SWNS/BoF component (Figure 35A) and German Bank spawning area (Figure 35B), and from -1.2 to 2.2 for the Scots Bay spawning area (Figure 35C). There is no apparent trend, as the series are very short. However, for the overall SWNS/BoF component, the trend appears to be increasing estimates of total mortality in the past two years after an overall decreasing trend in the four years prior to that. Similarly, for the German Bank spawning area the trend appears to be decreasing estimates of total mortality from 2008-2012, a leveling off in 2013, and an increase in 2014. For Scots Bay, the estimates of total mortality have had an overall decreasing trend from 2005-2012, with an increase observed in the past two years.

Stock Trends

The 2008 acoustic biomass estimates decreased 42% for all survey areas in Scots Bay, Trinity Ledge, and German Bank, and were the lowest recorded estimates since acoustic surveys began in 1997 (Power et al. 2010a). There was an increase in 2009 to 486,900t and a decrease in 2010 to 312,100t. The acoustic SSB estimate for the overall SWNS/BoF component increased in both 2011 and 2012 to 448,771t and 476,026t, respectively. In 2013, the acoustic SSB estimate for the overall SWNS/BoF component decreased by 28% to 341,694t (95% C.I.: +/- 160,115t) before increasing to 468,736t (95% C.I.: +/- 185,679t) in 2014. Overall, the SSB estimate in 2014 was above the long-term average of 450,010t (Table 13).

In the past, industry and DFO have explored ways to manage the complexity within each component (e.g. distributing fishing effort among spawning areas according to their relative size) and accounting for the interaction among components (e.g. fishing restrictions on some areas of mixing). The total number of fish removals decreased in 2013 by 1% from 2012 and increased in 2014 by 5%. The largest yearclass in the 2013 and 2014 catch were the 2 (2013: 34%; 2014: 30%) and 3-year olds (2013: 21%; 2014: 29%), the 2012 catch was primarily comprised of 4-year old (27%) and 2-year old (25%) fish. The large number of 2-year old fish in the 2013 catch came mostly from the Grand Manan and Long Island Shore areas (Table 19A). In 2014, the large number of 2-year old fish in the landings came from four areas: Grand Manan Banks, Long Island Shore, Gannet Dry Ledge and Trinity Ledge. However, neither 2013 nor 2014 provide an indication of a strong year-class (Figure 30).

Conservation Limit Reference Point

In 2012, a conservation limit reference point (LRP) for the SWNS/BoF herring spawning component (German Bank and Scots Bay) was identified as the 2005-2010 average acoustic survey biomass (377,272t), below which the risk of serious harm is unacceptable (Clark et al. 2012). Figure 36A presents the acoustic spawning biomass for the period 1999 to 2014 along with the three-year moving average, the long-term average, and the LRP. Figure 36B presents the same data as a relative biomass index. The 2010 biomass estimate was below the LRP by 17%. The biomass estimates increased above the LRP by 19% in 2011 and by 28% in 2012. The biomass estimate was again below the LRP by 8% in 2013 and returned above the LRP in 2014 by 24%.The three-year moving average increased above the LRP in 2011 and changed very little in 2012. Since 2012, the three-year moving average has been increasing slightly each year.

SOURCES OF UNCERTAINTY

When using acoustic survey results as a measure of absolute abundance there are numerous variables for which information is lacking (e.g. residence time on the spawning grounds and estimation of biomass in the acoustic dead/blind zones at the surface and close to bottom). Between 1999 and 2003, acoustic survey results were used as minimum estimates of absolute SSB abundance and the population was considered to be approximately 500,000t. An SSB of that size would have been expected to result in substantial growth of the population, improved age composition and low fishing mortality, given reasonable recruitment and the landings over that period. This has not occurred.

The assumption that surveys are additive continues to be a source of uncertainty (DFO 2007). Other significant issues relate to the completeness of coverage of the survey area on Trinity Ledge, inter-annual turn-over processes on each area, and factors that influence the target strength and acoustic backscatter (DFO 2007). A review of the tagging study by Melvin et al. (2014) on German Bank could help reduce uncertainty about residence time. Additionally, the mechanisms causing changes in fish weight-at-age are not understood.

The acoustic survey index provides fisheries independent information on the SSB but does not provide data on younger age classes. The size of recruiting herring year-classes is highly variable and with no index of recruitment, a large fraction of the catch is dependent on recruiting year-classes of uncertain abundances. Advice on stock status uses relative trends in SSB and exploitation rate because there is no accepted analytical assessment model. This creates a difficulty in putting current SSB in a historical context as acoustic data only exist for 1999-2014.

ECOSYSTEM CONSIDERATIONS

Herring is a keystone forage species prominent in the diet of many fish, seabirds, and marine mammals, and should be managed with these interactions in mind. At present, use of a natural mortality rate of 0.2, and maintenance of SSB at moderate to high levels, are assumed to take these interactions into consideration.

Management initiatives to protect spawning components are intended to maintain the spatial and temporal diversity of herring spawning. Any increase in the fishing on juveniles, which are of mixed or unknown stock affinity, would be inconsistent with this objective.

MANAGEMENT CONSIDERATIONS

The in-season management approach, which spreads effort in the fishery spatially and temporally among spawning components, is seen as beneficial in achieving conservation objectives. The "survey, assess, then fish" protocol is effective in spreading the catch appropriately among spawning components in proportion to their relative size and is considered an important safeguard. Acoustic surveys have become critical to stock status evaluation. It is important that there be continued attention to coverage and survey design in order to assure year-to-year consistency in all spawning areas.

Evaluations of progress against the conservation objectives in the IFMP from 2006 to 2009 are documented in Power et al. (2010b). In the 2012 fishery evaluation, the assessment of SSB showed that the 2011 and 2012 SSB estimates increased by 44% and 6% over the previous year's estimates in the main areas for Scots Bay and German Bank (Singh et al. 2014b). In 2013, SSB estimates decreased by 28% over the 2012 estimates, before increasing by 36% over the previous year's estimate in 2014, which was 2% lower than the 2012 estimate. The amount of spawning fish documented on Trinity Ledge in 2013 and 2014 was extremely low (950t and 4,772t, respectively). This assessment indicates that most of the recent fluctuation in the SWNS/BoF spawning complex SSB is occurring in the Scots Bay area although industry imposed a catch restriction of 5000t in Scots Bay since 2006. In 2013, there was a substantial decline, with a biomass estimate of less than half of the previous year to 76,218t (95% C.I.: +/- 20,984t). The surveyed biomass, however, increased in 2014 to a new high of 230,930t (95% C.I.: +/- 106,514t). There has been less variability in the SSB estimates on German Bank in the last five years; however, during this time the estimate has decreased at an average annual rate of 8%.

The SSB for the last three years remain below the long term average. Scots Bay showed a slight increase in the length of spawning period in comparison to recent years (as a result of an earlier start date), while German Bank showed a slight decrease in the length of spawning period in comparison to recent years (as a result of an earlier end date). Virtually no spawning occurred on Trinity Ledge; it is therefore difficult to determine the duration of the spawning period and the recorded spawning area is quite small. There was a change in spatial distribution in Scots Bay in comparison to the four previous years, particularly in 2014, with more catches and biomass inside the survey area box and wider spread throughout the box. On German Bank, the spawning distribution in 2013 and 2014 was generally spread within the 'strata box', with localized groups seen in both the northern and southern portions. In 2013, the catches of spawning herring extended farther south than in previous years, extending outside of the standard survey area.

The 2013 catch was primarily age 2 and age 3 fish (55% of catch by number), with age 5+ fish also contributing a large proportion of the catch (34% of catch by number). Similarly, the majority of the 2014 catch was primarily age 2 and age 3 fish (59% of catch, by number), with age 5+ fish also contributing a little less but still a large portion of the catch (29% of catch by number). The mean age of the acoustic catch at age decreased from 5.1 in 2012 to 4.8 in 2013, increasing to 5.0 years in 2014. The acoustic catch at age is higher than the mean age in the catch in both 2013 and 2014 indicating that older fish are collected in acoustic samples than in the catch. In comparison to the relative exploitation rate in 2012 (10%), the relative exploitation rate increased in 2013 (14%) and then decreased near to the 2012 level in 2014 (11%). The relative exploitation rate varied in response to fluctuating survey biomass in Scots Bay, and the historic high 2014 SSB in Scots Bay has caused the relative exploitation rate to decrease. There has been a trend of declining mean-weight at age. Declining trends in mean-weight at age since the 1970s have reduced productivity of the stock. German Bank is a cause for concern as the spawning biomass estimate has decreased at an average annual rate of 8% since 2011. Historically German Bank is the main spawning area.

The overall biomass estimate was below the LRP by 8% in 2013, but returned above the LRP in 2014 by 25%. The three-year moving average increased above the limit reference point in 2011 and changed very little in 2012. Since 2012, the three-year moving biomass average has been increasing slightly each year (Figure 36A). Overall, there were some positive signs from the fishery in 2013 and 2014 and some of the conservation objectives appear to have been met (Table 25).

OTHER CONSIDERATIONS

Observer reports of by-catch in purse seine sets have reported low numbers of non-herring species, most of which are released unharmed. Observers were present on purse seine gear trips in 4X in both 2013 (7 trips) and 2014 (9 trips). In 2013, observer reports indicated no by-catch of non-herring species in the purse seine sets. In 2014, by-catch from mid-water trawl for herring consisted of small amounts of Silver Hake, Mackerel (Atlantic), Porbeagle Shark, Spiny Dogfish, American Lobster, and a single Bluefin Tuna. All by-catch was released with the exception of very small quantities of Silver Hake, Mackerel (Atlantic), and Spiny Dogfish (Appendix A).

OFFSHORE SCOTIAN SHELF BANKS SPAWNING COMPONENT

There continues to be little information on stock size, distribution, and spawning behavior for the offshore component of the fishery, which currently supports a limited spring fishery on feeding herring. Recent information comes primarily from sampling of this fishery, as well as catches and samples from the summer research bottom trawl survey. There is no information on spawning timing or location for the offshore component of the fishery; however, spawning is presumed to occur in the fall based on the reproductive condition of sampled fish. There was no acoustic survey completed for the offshore area in 2013 and 2014. During the fall of 2014, however, industry conducted searches for herring aggregations, but failed to find spawning schools.

THE FISHERY

From 1963-1973, foreign fishing boats are estimated to have removed an average of 28,000t of herring per year (with a maximum of 121,000t in 1969) from the Offshore Scotian Shelf banks (Stephenson et al. 1987). Few herring were caught after the extension of jurisdiction in 1977 until 1996, when a fishery was initiated by the Scotia-Fundy purse seine fleet, and 11,700t were taken (Table 3). Since 1996, a fishery has occurred on feeding aggregations on the offshore banks, primarily in May and June, with landings ranging from 58t to 20,261t (Figure 37). The variability in catch levels is often due to problems of fish being too deep, weather, and market conditions, rather than a lack of herring abundance in these areas.

At-sea fishery observers were present on two purse seine gear trips to 'The Patch' area (4W) in 2013. In 2014, observers were also present on two trips (one trip to the Emerald Bank area and one trip to the Cow Pen area) to the 4W area by the *Morning Star* conducting mid-water trawls. There was no recorded by-catch in 2013. In 2014, the mid water trawl by-catch consisted of small amounts of Atlantic Cod, Haddock, jellyfishes, Silver Hake, Butterfish, Snow Crab (Queen), Squirrel or Red Hake and Squid, all of which were released (Appendix A).

In 2013, the landings were below average (6,988t since 1996) at 1,515t, up from the 1,255t in 2012. Most landings (1,466t) were caught by purse seine gear in May-June, in the vicinity of 'The Patch' (Table 1A; Figure 38A). Additional by-catch (47t) was reported from otter trawl fisheries for groundfish and Silver Hake on the Scotian Shelf. A reported 2t of herring was also caught via hand line in September of 2013. The age composition of the catch was primarily adult herring (age 3+) with larger proportions at age 5 (25%), age 6 (27%) and age 7 (18%; Table 26A; Figure 39A).

In 2014, the landings were well below average (6,988t since 1996) at 58t, down from the 1,515t in 2013. The majority of landings (35t) were reported as by-catch from otter trawl fisheries for groundfish and Silver Hake on the Scotian Shelf. An additional 23t were caught by purse seine gear in May, in the vicinity of 'The Patch' (Table 1B; Figure 38B). The age composition of the catch was primarily adult herring with 23% age 3, 15% ages 4 and 5 respectively, 23% age 6 and 14% age 7 (Table 26B; Figure 39B).

RESEARCH AND INDUSTRY SURVEYS

Industry Surveys

No industry survey was conducted in the Offshore Scotian Shelf area in 2013 or 2014. Industry, however, conducted searches for herring aggregations during the fall of 2014 but failed to find spawning schools.

July Bottom Trawl Survey

In recent years, summer research bottom trawl surveys have indicated a relatively widespread herring distribution on the Scotian Shelf (Power et al. 2013; Singh et al. 2014a). There are several shortcomings to using bottom trawl data as an overall abundance for a schooling pelagic species like herring. The bottom trawl data, while useful for documenting size, maturity, and distribution, are not considered indicative of overall herring abundance (Power et al. 2013). Table 27 presents herring abundances from 1970-2014 summer bottom trawl surveys. The trawl survey abundance has remained relatively constant since 2011, as the mean number per tow was 71 in 2011, 108 in 2012, 98 in 2013, and 91 in 2014. Figure 40 presents herring catches from the 2005-2014 DFO summer bottom trawl surveys. Figure 41 presents the 2003-2014 herring size distribution from the summer bottom trawl research survey for the entire 4VWX area. Herring abundance (number per tow) in the summer bottom trawl research survey decreased in the Bay of Fundy from 139 in 2012 to 122 in 2013 and decreased again in 2014 to 96. The overall 4VWX area showed an increase in abundance by number from 83 in 2012 to 98 in 2013. This was followed by a subsequent decrease to 67 in 2014 (Table 27).

OUTLOOK AND MANAGEMENT CONSIDERATIONS

The industry has been encouraged to explore and undertake structured surveys of the offshore area. Industry and DFO continue to work together to improve the biological basis for management. In the absence of recent information on stock status, there is no basis for evaluating the current 12,000t catch allocation, as described in the fishing plan (DFO 2003b).

COASTAL (SOUTH SHORE, EASTERN SHORE AND CAPE BRETON) NOVA SCOTIA SPAWNING COMPONENT

There is no quota for the coastal Nova Scotia spawning component and, apart from three areas, the size and historical performance of spawning groups are poorly documented. A fourth area, the Bras d'Or Lakes, has had no research or surveys for herring since 2000, and this fishery remains closed. Since 1996, the inshore gillnet roe fisheries off Glace Bay, East of Halifax and Little Hope have developed, participants have contributed to sampling and surveying, and the fisheries have attempted to follow the 'survey, assess, then fish' protocol. In addition to the traditional bait and personal-use fisheries, directed roe fisheries have occurred on several spawning grounds since the 1990s (Clark et al. 1999).

THE FISHERY AND RESOURCE STATUS

The landings in the gillnet roe fisheries along the coast of Nova Scotia increased from 2,956t in 2012 to 3,892t in 2013 and continued to increase in 2014 to 4,760t (Table 28 – Part A).

Little Hope/Port Mouton

The 2013 herring gillnet fishery in Little Hope/Port Mouton area extended from June 1st to October 31st. Total landings increased to 2,499t in 2013 from 2,150t in 2012 (Table 28 – Part A; Figure 42A). The catches occurred in three main areas: east of Port Mouton; southeast of Port Mouton; and east of Liverpool (Figure 42A). The 2014 herring gillnet fishery in Little Hope/Port Mouton area similarly lasted from May 31st to October 31st, 2014. The total landings increased again to 3,596t in 2014. Unlike 2013, the catches occurred in one main area, east of Port Mouton, and only minimal catches occurred southeast of Port Mouton and east of Liverpool (Figure 42B).

In 2013, four acoustics surveys were conducted in the Little Hope/Port Mouton area between September 19th and October 21st. The total spawning biomass for the Little Hope area for 2013 was taken as the sum of the four surveys. The total spawning biomass estimate was 74,532t, which is a substantial increase in the spawning biomass estimate over the four year low in 2012 of 12,756t. In 2014, there were four acoustics surveys conducted in the Little Hope/Port Mouton area between September 20th and October 6th. The surveyed biomass in the Little Hope/Port Mouton area decreased to 46,077t, which is approximately 28,000t less than in 2013, but is still above the five-year average of 37,664t (Table 28 - Part B; Figure 43).

In 2013 and 2014, the age composition of the gillnet catch for the Little Hope/Port Mouton area was primarily adult herring, with a substantial proportion (99%, 2013 and 97%, 2014) at age 4 and older (Tables 29A and 29B; Figures 47A and 47B).

East of Halifax (4W Eastern Shore)

Landings increased from 799t in 2012 to 1,390t in 2013 in the Eastern Shore area. The 2013 herring gillnet fishery in the Eastern Shore fishing area began on September 24th and ended on October 11th. Once again, this was primarily a herring roe fishery with catches reported from four main cluster areas: two areas near Halifax Harbour approaches (one south and one southeast) and two southwest of Jeddore Head (Table 28 - Part A; Figures 44A and 45). In 2014, the total landings decreased slightly to 1,163t with the majority of the catch occurring between October 5th and October 9th. Similar to 2013, the catches occurred primarily southwest of Jeddore Head and in a pair of clusters south and southeast of Halifax Harbour (Table 28 - Part A; Figures 44B and 45).

There were four and six acoustic surveys in the Halifax/Eastern Shore area in 2013 and 2014, respectively. Only one of the surveys in 2013 was supported by multi-panel gillnet deployment to collect representative samples of herring being surveyed. In 2014, there was a vast improvement, as six multi-panel gillnet samples were collected in support of the six acoustic surveys. The total spawning biomass for the Eastern Shore area for 2013 was taken as the sum of the four surveys. The total spawning biomass estimate was 6,870t in 2013, which represents an increase over the historic low estimate in 2012 of 3,668t. The estimated total spawning biomass increased again in 2014 to 9,586t, which is near the five-year average of 10,664, but well below the long-term average of 1998 to 2014 of 28,857t (Table 28 – Part B; Figure 45).

In 2013 and 2014, the age composition of the gillnet catch for the Halifax/Eastern Shore area was primarily adult herring, with a substantial proportion (99%, 2013 and 97%, 2014) at age 4 and older (Tables 29A and 29B; Figures 47A and 47B).

Glace Bay

The landings reported in 2013 for the Glace Bay area were only 2t, which is a decrease from 2012 when 7t were landed. In 2014, the total landings decreased further to 1t. There has not been a significant fishery in this area since 2006 when the landings were equal to 85t (Table 28 - Part A; Figure 46). Survey coverage for the Glace Bay area was poor in 2013 with only one survey on September 11th. Few spawning herring were documented in 2013 with an estimated biomass for the area at 50t (Figure 46). The total spawning biomass for the Glace Bay area for 2013 is in close agreement with the trend in landings since 2006 when the SSB was 500t. There were no surveys completed in 2014 (Table 28 - Part A; Figure 46).

Bras d'Or Lakes

This fishery remained closed. No sampling or acoustic surveys have been undertaken in the Bras d'Or lakes to document the size distribution or abundance of herring since 2000. It has been noted since 1997 that the status of herring in the Bras d'Or Lakes is cause for concern. With no sampling or acoustic surveys in recent years, there is no evidence to support any change. Therefore, it is appropriate to reiterate, from a biological perspective, that no fishing should take place on this spawning component.

Age Composition

The age composition of the catch from the fishery for the overall coastal Nova Scotia spawning component in percentage numbers was primarily adult herring age 4 and older, 98% in 2013 and 97% in 2014 (Tables 30A and 30B; Figures 47A and 47B). The mean age of the catch decreased in 2014 to 5.93 from 6.62 in 2013. Appendix B shows the 2013 and 2014 ageing agreement testing between the primary ager and self on a random selection of all survey and commercial otoliths.

OUTLOOK AND MANAGEMENT CONSIDERATIONS

Management approaches and recent research efforts have improved knowledge in three areas (Little Hope/Port Mouton, Halifax/Eastern Shore and Glace Bay), but there has been no information for any adjacent areas. The sporadic surveying in the Glace Bay area mean that no biomass estimates can be identified for the area. The survey method used to estimate abundance in the coastal component differed from that used in SWNS/BoF (Melvin and Power 1999). One difference is the way in which surveys were included, excluded, or combined, which may overestimate abundance.

Individual spawning groups within the entire coastal component are considered vulnerable to fishing because of their relatively small size and proximity to shore. It has been recommended that no coastal spawning area experience a large effort increase in new areas until enough information is available to evaluate the status of the new group.

Since 1997, the status of herring in the Bras d'Or Lakes has been recognized as cause for concern. Since there has been no research or surveys in recent years, it is appropriate to reiterate that no fishing should take place on this spawning component.

The main areas for Little Hope/Port Mouton and Halifax/Eastern Shore use 10% of a five-year rolling average of surveyed acoustic biomass to set annual removals. It is recommended that despite the recent increases in survey biomass from year-to-year, the "survey, assess, then fish" protocol using the five-year average should be adhered to.

SOUTHWEST NEW BRUNSWICK MIGRANT JUVENILES

For over a century, the SWNB weir and shutoff fisheries have relied on the aggregation of large numbers of juvenile herring (ages 1-3) near shore at the mouth of the Bay of Fundy. These fish have been considered to be a mixture of juveniles, dominated by those originating from NAFO Subarea 5 spawning components and have, therefore, been excluded from the 4WX quota.

The success of this passive fishery is historically unpredictable, and the landings time series for this fishery may not be indicative of abundance because catches are extremely susceptible to many factors in addition to abundance, including effort. The number and distribution of active weirs have decreased over the past decade, due in part to the conversion of sites to aquaculture, as well as reduced landings in the past 30 years in the Passamaquoddy Bay area (Table 11). Figures 48A and 48B present the locations of the New Brunswick weirs and the corresponding landings for the 2013 and 2014 fishing seasons. Table 30 shows the monthly herring weir landings weirs from 1978 to 2014.

Landings in the New Brunswick weir and shut-off fishery increased from the historic low in 2012 of 504t to 6,431t in 2013. In 2014, landings decreased to 2,149t, the second lowest since 1963. It is notable that in 2007 landings were 30,944t, the highest in nearly 20 years and higher than the long term average of 21,752t (Table 3; Figure 49). The age distribution of fish caught in the New Brunswick weir and shutoff fishery were mostly juveniles, which are well suited to the sardine market, with 93% at either age 1 or age 2 in 2013 (Table 31A, Figure 50A) and 96% at either age 1 or age 2 in 2014 (Table 31B; Figure 50B). The number of weirs with catches (number of active weirs) increased in the 2013 to 49 from the historic low of 4 in 2012. The number of weirs with catches decreased in 2014 to 26 (Table 11). The primary sources of information for assessing this component are the landings, which have declined markedly from the 1980s to present.

5Z GEORGES BANK

The activities of mid-water trawlers and herring purse seiners on the Canadian portion of Georges Bank (area 5Z) are monitored using the Vessel Monitoring System, and there were no trips to the area and no reported landings in 2013 and 2014.

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TABLES

Table 1A. 4VWX herring fishery landings (t) by month, gear sector and management unit for 2012-2013 quota year (as of December 31, 2013). A dash (-) indicates no data.

			Month												
2012-2013 Quota Year	**Area**	**Gear**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
S.W. Nova Scotia	4X	Fall P. Seine (2012)	-	-	-	-	-	-	-	-	-	247	111	-	358
	4X	Winter P. Seine (2013)	-	-	-	-	-	-	-	-	-	-	-	-	-
	4X	Summer P. Seine (2013)	-	-	-	-	1,449	8,471	11,829	11,023	8,224	3,888	-	-	44,884
	4X	Gillnet "Stock" (2013)	-	-	-	-	-	-	107	462	700	-	-	-	1,270
	4X	N.S. Weirs (2013)	-	-	-	18	20	5	1	0	-	-	-	-	43
S.W. Nova Scotia Total for 2012-2013 Quota Year			-	-	-	18	1,469	8,476	11,937	11,485	8,924	4,135	111	-	46,554
Coastal Nova Scotia (South Shore, Eastern Shore, Cape Breton)	4Vn, 4X	Trap	-	-	-	-	0	45	-	-	-	-	-	-	46
	4Vn	Cape Breton Gillnet	-	-	-	-	1	2	-	-	-	-	-	-	2
	4W	Eastern Shore Gillnet	-	-	-	-	-	-	-	-	850	540	-	-	1,390
	4X	Little Hope Gillnet	-	-	-	-	-	0	-	1	728	1,770	-	-	2,499
Coastal Nova Scotia Total for 2013 Calendar Year			-	-	-	-	1	47	-	1	1,578	2,310	-	-	3,937
Offshore Scotian Shelf	4WX	Offshore P. Seine	-	-	-	-	1,113	353	-	-	-	-	-	-	1,466
	4WX	Bottom Trawl + Misc.	7	6	5	3	8	10	1	-	4	3	1	2	49
Offshore Scotian Shelf total for 2013 Calendar Year			7	6	5	3	1,121	363	1	-	4	3	1	2	1,515
S.W. New Brunswick	4X	N.B. Weirs	-	-	-	-	7	612	1,517	1,797	1,051	919	-	-	5,902
Migrant Juveniles	4X	N.B. Shutoff	-	-	-	-	-	25	119	203	119	65	-	-	530
S.W. New Brunswick Migrant Juveniles for 2013 calendar year			-	-	-	-	7	636	1,635	2,000	1,170	983	-	-	6,431
														Total 2012-2013	58,332

Table 1B. 4VWX herring fishery landings (t) by month, gear sector, and management unit for 2013-2014 quota year (as of December 31, 2014). A dash (-) indicates no data.

2013-2014 Quota Year	**Area**	**Gear**	**Month**												**Total**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
S.W. Nova Scotia	4X	Fall P. Seine (2013)	-	-	-	-	-	-	-	-	-	1,320	140	-	1,460
	4X	Winter P. Seine (2014)	-	-	-	-	-	-	-	-	-	-	-	-	-
	4X	Summer P. Seine (2014)	-	-	-	-	1,373	9,015	10,562	17,216	6,621	1,734	-	-	46,522
	4X	Gillnet "Stock" (2014)	-	-	-	0	0	-	291	1,689	122	-	-	-	2,102
	4X	N.S. Weirs (2014)	-	-	-	1	115	50	-	-	-	-	-	-	166
S.W. Nova Scotia Total for 2013-2014 Quota Year			-	-	-	1	1,489	9,065	10,852	18,905	6,743	3,054	140	-	50,250
Coastal Nova Scotia (South Shore, Eastern Shore, Cape Breton)	4Vn, 4X	Trap	-	-	-	-	-	0	-	-	-	-	-	-	0
	4Vn	Glace Bay Gillnet	-	-	-	-	0	0	-	-	-	-	-	-	0
	4W	Eastern Shore Gillnet	-	-	-	-	-	-	-	-	371	792	-	-	1,163
	4X	Little Hope Gillnet	-	-	-	-	0	-	-	-	2,616	979	-	-	3,596
Coastal Nova Scotia Total for 2014 Calendar Year			-	-	-	-	0	1	-	-	2,988	1,771	-	-	4,760
Offshore Scotian Shelf	4WX	Offshore P. Seine	-	-	-	-	23	-	-	-	-	-	-	-	23
	4WX	Bottom Trawl + Misc.	1	4	5	1	2	3	0	0	10	8	1	1	35
Offshore Scotian Shelf Total for 2014 Calendar Year			1	4	5	1	25	3	0	0	10	8	1	-	58
S.W. New Brunswick Migrant Juveniles	4X	N.B. Weirs	-	-	-	-	-	70	130	147	449	774	-	-	1,571
	4X	N.B. Shutoff	-	-	-	-	-	-	35	380	155	-	-	8	578
S.W. New Brunswick Migrant Juveniles for 2014 Calendar Year			-	-	-	-	-	70	165	527	604	774	-	-	2,149
														Total 2013-2014	57,216

Table 2A. 4WX herring fishery landings (t) by month, gear sector and management unit for 2013-2014 quota year (as of December 31, 2013). A dash (-) indicates no data.

			Month												Total
2013-2014 Quota Year	**Area**	**Gear**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
S.W. Nova Scotia	4X	Fall 2013 P. Seine	-	-	-	-	-	-	-	-	-	1,320	140	-	1,460
		Winter 2014 P. Seine	-	-	-	-	-	-	-	-	-	-	-	-	-
2014 Calendar Year	4VWX	Misc. Trawl	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-2014 Total (from Oct. 15, 2013 to Dec. 31, 2013)			-	-	-	-	-	-	-	-	-	1,320	140	-	1,460

Table 2B. 4WX herring fishery landings (t) by month, gear sector and management unit for 2014-2015 quota year (as of December 31, 2014). A dash (-) indicates no data.

			Month												
2014-2015 Quota Year	**Area**	**Gear**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
S.W. Nova Scotia	4X	Fall 2014 P. Seine	0	0	-	-	-	-	-	-	-	928	363	-	1,291
		Winter 2015 P. Seine	0	0	-	-	-	-	-	-	-	-	-	-	-
2015 Calendar Year	4VWX	Misc. Trawl	-	-	-	-	-	-	-	-	-	-	-	-	-
2014-2015 Total (from Oct. 15, 2014 to Dec. 31, 2014)			-	-	-	-	-	-	-	-	-	928	363	-	1,291

Table 3. Historical series of nominal and adjusted annual landings (t) by major gear components and seasons of the 4WX herring fishery from 1963-2014. The 1963-1973 offshore Scotian Shelf landings are from Stephenson et al. (1987). A dash (-) indicates no data.

Year^	4W Winter Purse Seine	4Xs Fall & Winter Purse Seine	4Xqr Summer Purse Seine	4X Summer Gillnet	4Xr Nova Scotia Weir	4WX Stock Nominal Landings	4WX Stock Adjusted Landings*	4WX Stock TAC	Non-Stock 4Xs N.B. Weir & Shutoff	4VWX Coastal Nova Scotia	Offshore Scotian Shelf Banks	Total 4VWX Adjusted Landings
1963	-	6,871	15,093	2,955	5,345	30,264	30,264	-	29,366	-	3,000	62,630
1964	-	15991	24,894	4,053	12,458	57,396	57,396	-	29,432	-	2,000	88,828
1965	-	15,755	54,527	4,091	12,021	86,394	86,394	-	33,346	-	6,000	125,740
1966	-	25,645	112,457	4,413	7,711	150,226	150,226	-	35,805	-	2,000	188,031
1967	-	20,888	117,382	5,398	12,475	156,143	156,741	-	30,032	-	1,000	187,773
1968	-	42,223	133,267	5,884	12,571	193,945	196,362	-	33,145	-	18,000	247,507
1969	25,112	13,202	84,525	3,474	10,744	137,057	150,462	-	26,539	-	121,000	298,001
1970	27,107	14,749	74,849	5,019	11,706	133,430	190,382	-	15,840	-	87,000	293,222
1971	52,535	4,868	35,071	4,607	8,081	105,162	129,101	-	12,660	-	28,000	169,761
1972	25,656	32,174	61,158	3,789	6,766	129,543	153,449	-	32,699	-	21,000	207,148
1973	8,348	27,322	36,618	5,205	12,492	89,985	122,687	-	19,935	-	14,000	156,622
1974	27,044	10,563	76,859	4,285	6,436	125,187	149,670	-	20,602	-	-	170,272
1975	27,030	1,152	79,605	4,995	7,404	120,186	143,897	-	30,819	-	-	174,716
1976	37,196	746	58,395	8,322	5,959	110,618	115,178	-	29,206	-	-	144,384
1977	23,251	1,236	68,538	18,523	5,213	116,761	117,171	109,000	23,487	-	-	140,658
1978	17,274	6,519	57,973	6,059	8,057	95,882	114,000	110,000	38,842	-	-	152,842
1979	14,073	3,839	25,265	4,363	9,307	56,847	77,500	99,000	37,828	-	-	115,328
1980	8,958	1,443	44,986	19,804	2,383	77,574	107,000	65,000	13,525	-	-	120,525
1981	18,588	1,368	53,799	11,985	1,966	87,706	137,000	100,000	19,080	-	-	156,080
1982	12,275	103	64,344	6,799	1,212	84,733	105,800	80,200	25,963	-	-	131,763
1983	8,226	2,157	63,379	8,762	918	83,442	117,400	82,000	11,383	-	-	128,783
1984	6,336	5,683	58,354	4,490	2,684	77,547	135,900	80,000	8,698	-	-	144,598
1985	8,751	5,419	87,167	5,584	4,062	110,983	165,000	125,000	27,863	-	-	192,863
1986	8,414	3,365	56,139	3,533	1,958	73,409	100,000	97,600	27,883	-	-	127,883
1987	8,780	5,139	77,706	2,289	6,786	100,700	147,100	126,500	27,320	-	-	174,420
1988	8,503	7,876	98,371	695	7,518	124,653	199,600	151,200	33,421	-	-	233,021
1989	6,169	5,896	68,089	95	3,308	83,557	97,500	151,200	44,112	-	-	141,612
1990	8,316	10,705	77,545	243	4,049	102,627	172,900	151,200	38,778	-	-	211,678
1991	17,878	2,024	73,619	538	1,498	97,010	130,800	151,200	24,576	-	-	155,376
1992	14,310	1,298	80,807	395	2,227	100,227	136,000	125,000	31,967	-	-	167,967
1993	10,731	2,376	81,478	556	2,662	98,464	105,089	151,200	31,573	-	-	136,662
1994	9,872	3,174	64,509	339	2,045	80,099	80,099	151,200	22,241	-	-	102,340
1995	3,191	7,235	48,481	302	3,049	62,499	62,499	80,000	18,248	-	-	80,747
1996	2,049	3,305	42,708	6,340	3,476	58,068	58,068	57,000	15,913	1,450	11,745	87,176
1997	1,759	2,926	40,357	6,816	4,019	56,117	56,117	57,000	20,552	2,340	20,261	99,270
1998	1,405	1,494	67,433	2,231	4,464	77,027	77,027	90,000	20,091	4,120	5,591	106,829
1999	1,235	4,764	64,432	1,660	5,461	77,552	77,552	105,000	18,644	5,618	12,646	114,460
2000	1,012	4,738	78,010	823	701	85,284	85,284	100,000	16,829	4,283	2,182	108,578
2001	0	4,001	62,004	1,857	3,708	71,570	71,570	78,000	20,209	6,006	12,503	110,288
2002	367	5,257	69,894	393	1,143	77,054	77,054	78,000	11,874	10,375	7,039	106,342
2003	0	8,860	79,140	439	921	89,360	89,360	93,000	9,003	9,162	998	108,523
2004	0	5,659	69,015	225	3,130	78,029	78,029	83,000	20,686	6,924	4,165	109,804
2005	0	2,601	43,487	566	2,245	48,899	48,899	50,000	13,055	6,311	5,263	73,528
2006	0	930	45,002	719	2,508	49,159	49,159	50,000	12,863	6,566	9,809	78,397
2007	0	1,847	46,045	1,334	1,130	50,356	50,356	50,000	30,944	5,240	5,385	91,925
2008	0	2,000	50,022	15	2,524	54,561	54,561	55,000	6,447	3,704	918	65,631
2009	0	2,807	50,802	117	387	54,113	54,113	55,000	4,031	9,783	9,088	77,015
2010	0	2,787	41,345	204	1,198	45,534	45,534	55,000	10,958	5,575	11,862	73,929
2011	0	1,584	46,784	638	1,004	50,010	50,010	50,000	3,711	3,606	10,482	67,809
2012	0	1,077	45,918	471	149	47,614	47,614	50,000	504	3,007	1,255	52,381
2013	0	358	44,884	1,270	43	46,554	46,554	50,000	6,431	3,937	1,515	58,437
2014	0	1,460	46,522	2,102	166	50,250	50,250	50,000	2,149	4,760	58	57,216

^Annual landings by purse seiners are defined for the period from October 15 of the preceding year to October 14 of the current year.

*Adjusted totals include misreporting adjustments for 1978-84 (Mace 1985) and for 1985-93 (Stephenson 1993; Stephenson et al. 1994).

All landings by other gear types are for the calendar year.

Table 4A. Herring purse seine landings (t) by fishing ground areas (as identified from the 10-mile boxes shown in Figure 4) from 1985-2014 for the 4WX stock component. Note that the German Bank fishing ground area used in these tables is not the same as the catch box used to define the German Bank acoustic survey box used in Table 7.

Stock Areas	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Browns Bank	0	732	0	0	0	0	0	86	0	1,903	1,554	40	14	3,139	2,197	1,137	486	0	0
Chedabucto Bay	4,216	7,498	6,374	7,523	8,325	12,470	12,596	3,084	1,378	1,407	2,049	1,759	0	1,583	1,151	10	0	0	0
Gannet,Dry Ledge	5,675	2,187	1,474	14,901	2,010	4,213	6,294	18,527	2,935	2,588	2,693	1,963	4,590	4,156	10,296	12,674	3,877	9,047	6,965
German Bank	15,522	13,346	16,547	18,392	8,087	11,744	23,193	3,235	4,045	9,662	19,549	15,898	13,576	20,556	24,660	25,631	24,139	22,355	21,573
Grand Manan	4,989	5,823	4,298	4,440	4,300	5,442	4,225	2,722	783	6,846	5,297	6,005	5,312	15,983	7,912	18,185	10,545	17,753	17,258
Long Island	974	3,365	7,499	10,722	21,719	18,484	9,470	3,213	2,814	7,666	7,906	4,385	3,557	12,360	18,286	11,199	12,904	6,642	12,639
Lurcher	476	132	0	2,928	18	65	151	2,141	1,560	530	382	243	599	57	0	715	227	7,683	1,872
N.B. Coastal	188	621	960	1,031	3,033	2,347	488	992	598	99	1,502	271	1,176	782	1,867	361	1,250	3,113	3,914
Pollock Point	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,563	0	0
S.W. Grounds	558	1,108	184	181	276	56	521	225	2,961	3,444	6,205	3,035	797	1,239	3,241	1,879	53	791	73
Scots Bay	0	36	3,822	4,145	6,583	9,003	7,982	7,987	5,258	10,840	980	8,984	4,894	8,210	1,789	10,926	10,739	8,202	19,196
Seal Island	13,818	8,894	11,560	19,019	23,420	25,344	12,740	10,455	3,874	2,820	465	1,567	492	617	567	206	101	238	1096
Trinity	35,860	13,505	18,744	18,539	266	1,113	3,259	4,612	1,348	2,366	370	3,448	5,308	2,825	1,220	103	113	1,609	0
Yankee Bank	0	0	0	194	250	3,647	817	119	10	175	323	9	4	159	82	133	8	78	0
Unknown	184	500	200	0	0	200	579	494	140	0	73	0	0	62	84	27	0	0	1,103
Total Purse Seine	82,458	57,745	71,661	102,015	78,287	94,127	82,314	57,888	27,703	50,345	49,348	47,606	40,319	71,727	73,350	83,186	66,005	77,511	85,689

Stock Areas	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Recent 5 year	Recent Decade	All Year Avg.	2014 vs 2013	2014 vs 5 year	2014 vs Decade	2014 vs Overall
Browns Bank	45	0	88	34	0	0	0	0	21	0	0	4	14	383	0	-4	-14	-383
Chedabucto Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	2,381	0	0	0	-2,381
Gannet,Dry Ledge	4,456	3,117	6,764	11,344	10,006	8,656	771	2,564	3,177	5,903	12,659	5,015	6,496	6,216	6,756	7,644	6,163	6,443
German Bank	14,175	14,171	16,522	15,085	22,437	19,354	17,859	21,513	30,253	13,308	14,126	19,412	18,463	17,017	818	-5,286	-4,337	-2,891
Grand Manan	7,542	5,740	7,716	10,011	10,493	12,368	15,602	12,493	4,106	12,437	9,369	10,802	10,034	8,533	-3,068	-1,432	-664	836
Long Island	13,115	8,037	1,884	4,604	3,207	2,983	1,658	590	160	4,942	2,607	1,991	3,067	7,320	-2,335	616	-460	-4,713
Lurcher	7,268	1,692	2,809	2,305	684	3,676	348	1,823	2,050	2,872	2,134	1,846	2,039	1,581	-738	288	95	553
N.B. Coastal	2,707	787	1,889	851	2,205	5,023	2,864	1,821	132	1,760	557	1,427	1,789	1,506	-1,203	-870	-1,232	-949
Pollock Point	0	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0	0	-52
S.W. Grounds	0	1,228	1,206	30	752	178	169	0	0	0	54	45	362	1,015	54	9	-308	-961
Scots Bay	24,869	6,239	3,352	4,116	2,373	902	4,165	5,130	4,940	4,786	4,498	4,704	4,050	6,498	-288	-206	448	-2,000
Seal Island	0	1,358	209	0	15	12	0	0	161	0	0	32	176	4,635	0	-32	-176	-4,635
Trinity	370	1,448	3,725	112	0	325	616	1,927	1,255	330	1,808	1,187	1,155	4,217	1,478	621	653	-2,409
Yankee Bank	0	528	2	62	178	131	0	0	0	0	0	0	90	230	0	0	-90	-230
Unknown	127	181	396	39	0	14	0	0	20	6	0	5	66	148	-6	-5	-66	-148
Total Purse Seine	74,674	44,526	46,561	48,594	52,350	53,621	44,052	47,861	46,276	46,344	47,812	46,469	47,800	61,732	1,468	1,343	13	-13,919

Table 4B. Herring purse seine landings (%) by fishing ground areas (as identified from the 10-mile boxes shown in Figure 4) from 1985-2014 for the 4WX stock component.

Stock Areas	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Browns Bank	0%	1%	0%	0%	0%	0%	0%	0%	0%	4%	3%	0%	0%	4%	3%	1%	1%	0%	0%
Chedabucto Bay	5%	13%	9%	7%	11%	13%	15%	5%	5%	3%	4%	4%	0%	2%	2%	0%	0%	0%	0%
Gannet,Dry Ledge	7%	4%	2%	15%	3%	4%	8%	32%	11%	5%	5%	4%	11%	6%	14%	15%	6%	12%	8%
German Bank	19%	23%	23%	18%	10%	12%	28%	6%	15%	19%	40%	33%	34%	29%	34%	31%	37%	29%	25%
Grand Manan	6%	10%	6%	4%	5%	6%	5%	5%	3%	14%	11%	13%	13%	22%	11%	22%	16%	23%	20%
Long Island	1%	6%	10%	11%	28%	20%	12%	6%	10%	15%	16%	9%	9%	17%	25%	13%	20%	9%	15%
Lurcher	1%	0%	0%	3%	0%	0%	0%	4%	6%	1%	1%	1%	1%	0%	0%	1%	0%	10%	2%
N.B. Coastal	0%	1%	1%	1%	4%	2%	1%	2%	2%	0%	3%	1%	3%	1%	3%	0%	2%	4%	5%
Pollock Point	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	5%
S.W. Grounds	1%	2%	0%	0%	0%	0%	1%	0%	11%	7%	13%	6%	2%	2%	4%	2%	0%	1%	0%
Scots Bay	0%	0%	5%	4%	8%	10%	10%	14%	19%	22%	2%	19%	12%	11%	2%	13%	16%	11%	22%
Seal Island	17%	15%	16%	19%	30%	27%	15%	18%	14%	6%	1%	3%	1%	1%	1%	0%	0%	0%	1%
Trinity	43%	23%	26%	18%	0%	1%	4%	8%	5%	5%	1%	7%	13%	4%	2%	0%	0%	2%	0%
Yankee Bank	0%	0%	0%	0%	0%	4%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Unknown	0%	1%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Total Purse Seine	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Stock Areas	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Recent 5 year	Recent Decade	All Year Avg.	2014 vs 2013	2014 vs 5 year	2014 vs Decade	2014 vs Overall
Browns Bank	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	-1%
Chedabucto Bay	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	-3%
Gannet,Dry Ledge	6%	7%	15%	23%	19%	16%	2%	5%	7%	13%	26%	11%	13%	10%	14%	16%	13%	16%
German Bank	19%	32%	35%	31%	43%	36%	41%	45%	65%	29%	30%	42%	39%	29%	1%	12%	-9%	1%
Grand Manan	10%	13%	17%	21%	20%	23%	35%	26%	9%	27%	20%	23%	21%	14%	-7%	4%	-1%	5%
Long Island	18%	18%	4%	9%	6%	6%	4%	1%	0%	11%	5%	4%	6%	11%	-5%	1%	-1%	-6%
Lurcher	10%	4%	6%	5%	1%	7%	1%	4%	4%	6%	4%	4%	4%	3%	-2%	1%	0%	2%
N.B. Coastal	4%	2%	4%	2%	4%	9%	7%	4%	0%	4%	1%	3%	4%	3%	-3%	2%	-3%	-1%
Pollock Point	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-0%
S.W. Grounds	0%	3%	3%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	0%	-1%	-2%
Scots Bay	33%	14%	7%	8%	5%	2%	9%	11%	11%	10%	9%	10%	9%	11%	-1%	1%	1%	-1%
Seal Island	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	-6%
Trinity	0%	3%	8%	0%	0%	1%	1%	4%	3%	1%	4%	3%	2%	6%	3%	1%	1%	-3%
Yankee Bank	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-0%
Unknown	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-0%	0%	0%	-0%
Total Purse Seine	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-	-	-

Table 5A. Purse seine landings (t) by grounds for non-stock areas from 1985-2014 (with negative deviations shaded).

Non-stock Areas	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Georges Bank	0	0	0	0	0	91	64	0	0	266	0	2,491	79	0	0	265	0	0	0
Liverpool	0	0	0	0	0	0	13	0	4,067	4,177	0	0	0	0	0	0	0	0	0
Shelburne	0	0	59	0	0	0	64	0	526	161	0	56	0	0	0	0	0	0	0
Halifax	0	0	0	0	0	0	0	0	652	1,945	0	585	455	0	0	1,002	472	367	0
Offshore Banks	0	0	0	0	0	0	0	0	0	0	0	11,800	18,770	4,284	8,669	1,645	3,977	5,078	722
Western Hole	0	41	154	0	0	0	213	3,451	2,255	1,495	108	127	691	1,012	1,057	47	7,712	1,884	156
Non-stock Total	0	41	213	0	0	91	353	3,451	7,500	8,044	108	15,058	19,995	5,296	9,726	2,958	12,161	7,329	878

Non-stock Areas	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Recent 5 year	Recent Decade	All Year Avg.	2014 vs 2013	2014 vs 5 year	2014 vs Decade	2014 vs Overall
Georges Bank	0	0	0	0	0	0	0	0	0	0	0	0	0	108	0	0	0	-108
Liverpool	0	0	0	0	0	0	0	0	0	0	0	0	0	275	0	0	0	-275
Shelburne	0	29	0	0	0	0	0	0	0	0	0	0	3	30	0	0	-3	-30
Halifax	0	0	0	0	0	0	0	0	0	0	0	0	0	183	0	0	0	-183
Offshore Banks	4,054	4,115	4,846	2,515	829	8,918	7,432	10,455	949	1,466	23	4,065	4,155	3,352	-1,443	-4,042	-4,132	-3,329
Western Hole	0	214	192	220	52	114	4,405	0	261	0	0	933	546	862	0	-933	-546	-862
Non-stock Total	4,054	4,358	5,038	2,735	881	9,032	11,837	10,455	1,210	1,466	23	4,998	4,704	4,810	-1,443	-4,975	-4,681	-4,787

Table 5B. Percentage purse seine landings by grounds for non-stock areas from 1985-2014 (with negative deviations shaded).

Non-stock Areas	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Georges Bank	0%	0%	0%	0%	0%	100%	18%	0%	0%	3%	0%	17%	0%	0%	0%	9%	0%	0%	0%
Liverpool	0%	0%	0%	0%	0%	0%	4%	0%	54%	52%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shelburne	0%	0%	28%	0%	0%	0%	18%	0%	7%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Halifax	0%	0%	0%	0%	0%	0%	0%	0%	9%	24%	0%	4%	2%	0%	0%	34%	4%	5%	0%
Offshore Banks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	78%	94%	81%	89%	56%	33%	69%	82%
Western Hole	0%	100%	72%	0%	0%	0%	60%	100%	30%	19%	100%	1%	3%	19%	11%	2%	63%	26%	18%
Non-stock Total	0%	100%	100%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Non-stock Areas	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Recent 5 year	Recent Decade	All Year Avg.	2014 vs 2013	2014 vs 5 year	2014 vs Decade	2014 vs Overall
Georges Bank	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	-5%
Liverpool	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	-4%
Shelburne	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	-0%	-2%
Halifax	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	-3%
Offshore Banks	100%	94%	96%	92%	94%	99%	63%	100%	78%	100%	100%	88%	92%	52%	0%	12%	8%	48%
Western Hole	0%	5%	4%	8%	6%	1%	37%	0%	22%	0%	0%	12%	8%	25%	0%	-12%	-8%	-25%
Non-stock Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-	-	-

Table 6. Gillnet landings (t) for Scots Bay and German Bank from 2004-2014. Dash (-) indicates no data/not applicable.

Year	Scots Bay			German Bank		
	Start Day	End Day	Landings (t)	Start Day	End Day	Landings (t)
2004	-	-	-	-	-	-
2005	-	-	-	09-Jun-05	11-Jul-05	80
2006	-	-	-	-	-	-
2007	-	-	-	11-Jun-07	20-Sep-07	22
2008	-	-	-	25-Sep-08	25-Sep-08	6
2009	15-Apr-09	11-May-09	1	10-Sep-09	11-Sep-09	1
2010	16-Apr-10	14-Jun-10	1	19-Aug-10	24-Sep-10	33
2011	-	-	-	20-Sep-11	20-Sep-11	1
2012	14-Apr-12	09-May-12	1	15-Aug-12	03-Oct-12	296
2013	23-Jul-13	21-Aug-13	305	19-Aug-13	09-Sep-13	854
2014	30-Apr-14	13-Aug-14	418	12-Aug-14	09-Sep-14	1523
Scots Bay Gillnet Landing (t) Average			145	German Bank Gillnet Landings (t) Average		313

Table 7. German Bank acoustic catch area (dotted line large box) as shown in Figures 12 and 13 herring landings (t) (includes purse seines and gillnets) for 1985-2014 with start date, end date, landings (t) before August 15 (pre-spawning period), landings (t) after August 14 (spawning period), and proportion of TAC.

Year	Start Date	End Date	Duration No. Days	Total No. Slips	Landings before Aug. 15 (pre-spawn)	Landings on/after Aug. 15 (spawning)	Total Landing (t)	% Landings on/after Aug-14	TAC	German as % TAC
1985	22-Jun-85	08-Oct-85	109	428	8,856	14,228	23,084	62%	125,000	18%
1986	18-Jun-86	01-Oct-86	106	349	2,349	13,542	15,892	85%	97,600	16%
1987	26-May-87	14-Oct-87	142	403	5,138	13,218	18,357	72%	126,500	15%
1988	29-May-88	06-Oct-88	131	610	14,776	18,348	33,125	55%	151,200	22%
1989	28-May-89	15-Oct-89	141	313	2,061	12,087	14,148	85%	151,200	9%
1990	23-May-90	23-Oct-90	154	428	1,220	23,647	24,867	95%	151,200	16%
1991	02-Jun-91	15-Oct-91	136	621	11,800	18,328	30,127	61%	151,200	20%
1992	31-May-92	04-Oct-92	127	556	13,175	10,985	24,160	45%	125,000	19%
1993	24-May-93	29-Sep-93	129	192	7,912	1,092	9,003	12%	151,200	6%
1994	05-May-94	28-Sep-94	147	252	1,186	11,454	12,641	91%	151,200	8%
1995	05-Jun-95	06-Oct-95	124	301	434	21,339	21,773	98%	80,000	27%
1996	20-Jun-96	27-Oct-96	130	260	2,229	16,091	18,320	88%	57,000	32%
1997	11-Jul-97	14-Oct-97	96	327	2,009	17,110	19,119	89%	57,000	34%
1998	10-Jun-98	14-Oct-98	127	516	3,231	21,489	24,720	87%	90,000	27%
1999	20-Apr-99	20-Oct-99	184	666	18,508	16,401	34,909	47%	105,000	33%
2000	18-Apr-00	26-Oct-00	192	598	9,806	26,171	35,977	73%	100,000	36%
2001	22-May-01	20-Oct-01	152	521	5,312	22,156	27,468	81%	78,000	35%
2002	18-Apr-02	12-Oct-02	178	643	10,871	19,935	30,806	65%	78,000	39%
2003	05-May-03	15-Oct-03	164	392	8,900	20,070	28,970	69%	93,000	31%
2004	10-May-04	15-Oct-04	159	238	5,680	12,345	18,025	68%	83,000	22%
2005	16-May-05	13-Oct-05	151	364	8,069	12,039	20,107	60%	50,000	40%
2006	27-Jun-06	16-Oct-06	112	475	12,227	12,504	24,731	51%	50,000	49%
2007	15-May-07	05-Oct-07	144	540	13,948	13,307	27,255	49%	50,000	55%
2008	03-May-08	16-Oct-08	167	590	16,845	14,447	31,291	46%	55,000	57%
2009	05-May-09	13-Oct-09	162	502	12,092	16,454	28,546	58%	55,000	52%
2010	03-May-10	14-Oct-10	165	382	1,804	17,158	18,961	90%	55,000	34%
2011	03-May-11	13-Oct-11	164	421	5,512	19,175	24,687	78%	50,000	49%
2012	02-May-12	27-Oct-12	179	780	5,369	29,582	34,951	85%	50,000	70%
2013	06-May-13	11-Oct-13	159	686	6,324	12,700	19,025	67%	50,000	38%
2014	14-May-14	29-Sep-14	139	922	15,077	10,080	25,157	40%	50,000	50%

Table 8. Scots Bay herring purse seine landings (t) for 1987-2014.

Year	Min. Date	Max. Date	Duration in Days	Days with Landings	Landings (t)	No. Slips	Catch/Day with Catch	Catch/Slip
1987	08-Jul-87	06-Aug-87	30	20	3,398	91	169.88	37.34
1988	20-Jul-88	29-Jul-88	10	9	3,780	65	419.99	58.15
1989	19-Jul-89	13-Sep-89	57	35	6,021	164	172.04	36.72
1990	22-Jul-90	14-Aug-90	24	11	8,088	108	735.24	74.89
1991	05-Jul-91	14-Aug-91	41	16	7,365	163	460.30	45.18
1992	25-Jul-92	11-Aug-92	18	18	7,960	189	442.22	42.12
1993	25-Jul-93	01-Sep-93	39	32	5,228	100	163.36	52.28
1994	10-Jul-94	25-Aug-94	47	36	10,610	286	294.72	37.10
1995	24-Jul-95	26-Jul-95	3	3	907	33	302.33	27.48
1996	25-Jul-96	20-Aug-96	27	13	8,939	151	687.58	59.20
1997	30-Jul-97	27-Aug-97	29	19	4,847	91	255.11	53.26
1998	20-Jul-98	10-Sep-98	53	29	7,880	163	271.72	48.34
1999	19-Jul-99	17-Aug-99	30	16	1,789	40	111.81	44.73
2000	25-Jul-00	30-Aug-00	37	26	10,853	171	417.44	63.47
2001	10-Jul-01	21-Aug-01	43	30	10,739	176	357.97	61.02
2002	22-Jul-02	09-Sep-02	50	36	7,994	160	222.06	49.96
2003	21-Jul-03	05-Sep-03	47	34	19,196	237	564.59	81.00
2004	19-Jul-04	16-Sep-04	60	42	24,388	330	580.67	73.90
2005	26-Jul-05	09-Sep-05	46	27	5,872	96	217.48	61.17
2006	24-Jul-06	04-Sep-06	43	16	3,352	43	209.50	77.95
2007	16-Jul-07	31-Aug-07	47	21	4,116	79	196.00	52.10
2008	14-Jul-08	27-Aug-08	45	14	2,373	43	169.50	55.19
2009	12-Jul-09	11-Aug-09	31	8	902	18	112.75	50.11
2010	09-Jul-10	07-Sep-10	61	17	4,086	70	240.35	58.37
2011	04-Jul-11	01-Sep-11	60	16	5,093	72	318.31	70.74
2012	02-Jul-12	28-Aug-12	58	10	4,940	78	494.00	63.33
2013	24-Jun-13	02-Sep-13	71	9	4,702	58	522.44	81.07
2014	23-Jun-14	01-Sep-14	71	17	4,498	68	264.60	66.15

Table 9. Summary of 1998-2014 Spectacle Buoy and Trinity Ledge herring gillnet landings (t) with start and end dates, acoustic survey biomass estimates (t), and overall gillnet landings (t) reported from the area. Shaded cells refer to SSB estimates calculated without the CIF. Bold-outlined cell indicates that in 2002 the exploitation rate exceeded 100%. A dash (-) indicates no data; 'n/s' indicates no survey.

	Spec. Buoy Landings and Surveys				**Trinity Ledge Strata Box Landings and Surveys**					**Overall Stock Gillnet Landings (t)**
Year	**Start Day**	**End Day**	**Landings (t)**	**Survey SSB* (t)**	**Start Day**	**End Day**	**Landings (t)**	**Survey SSB* (t)**	**Exploitation Landings/ SSB**	
1998	10-May-98	30-Jun-98	484	n/s	24-Aug-98	21-Sep-98	1,668	n/s	n/s	2,153
1999	10-May-99	16-Jul-99	355	n/s	12-Aug-99	15-Sep-99	1,257	3,885	32%	1,612
2000	11-Jun-00	14-Jun-00	80	n/s	30-Aug-00	12-Sep-00	682	621	110%	814
2001	11-Jun-01	10-Jul-01	699	1,110	21-Aug-01	26-Sep-01	781	14,797	5%	1,576
2002	15-May-02	01-Jul-02	137	n/s	02-Sep-02	30-Sep-02	204	8,096	3%	378
2003	04-Jun-03	06-Jun-03	69	1,420	21-Aug-03	18-Sep-03	361	12,117	3%	439
2004	17-Jun-04	15-Jul-04	5	n/s	02-Sep-04	15-Sep-04	229	12,022	2%	229
2005	09-Jun-05	11-Jul-05	124	290	05-Sep-05	20-Sep-05	427	10,701	4%	570
2006	03-Jun-06	22-Jun-06	2	n/s	23-Aug-06	21-Sep-06	647	16,076	4%	719
2007	07-May-07	22-Jun-07	243	310	27-Aug-07	20-Sep-07	1,042	3,113	33%	1,334
2008	29-May-08	19-Jun-08	6	0	21-Aug-08	25-Sep-08	7	516	1%	15
2009	11-Jun-09	25-Jun-09	0.2	n/s	01-Sep-09	11-Sep-09	102	1,575	6%	117
2010	02-Jun-10	19-Jun-10	-	1,859	09-Aug-11	24-Sep-10	145	2,405	6%	204
2011	22-Jun-11	29-Jun-11	1	282	09-Aug-11	20-Sep-11	598	7,316	8%	638
2012	31-May-12	31-May-12	-	n/s	31-May-12	18-Sep-12	177	2,754	6%	471
2013	31-May-13	31-May-13	-	n/s	13-Aug-13	18-Sep-13	99	950	10%	965
2014	31-May-14	31-May-14	-	n/s	12-Aug-14	30-Sep-14	123	4,772	3%	1,661
Spec. Buoy Average			130	753	Gillnet Average		503	6,143	-	835

*SSB estimates calculated with CIF after 2003 inclusive.

Table 10. Monthly Nova Scotia weir landings (t) for 1978-2014.

YEAR	MONTH												Year Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1978	0	0	0	1	490	3,704	2,990	239	46	111	198	79	7,858
1979	0	0	0	0	811	3,458	1,418	420	39	136	57	0	6,339
1980	0	0	0	0	69	647	1,271	395	0	0	0	0	2,383
1981	0	0	0	0	50	437	983	276	37	0	41	0	1,824
1982	0	0	0	0	16	267	468	195	172	12	0	0	1,130
1983	0	0	0	2	286	141	188	208	53	0	18	0	896
1984	0	0	0	0	113	1,032	736	602	220	0	0	0	2,702
1985	0	0	0	0	378	1,799	1,378	489	0	0	11	0	4,055
1986	0	0	0	0	385	403	71	704	390	5	0	0	1,957
1987	0	0	0	0	1,503	2,526	1,215	1,166	367	0	0	0	6,776
1988	0	0	0	0	1,217	2,976	1,696	1,204	386	0	0	0	7,480
1989	0	0	0	0	340	1,018	870	843	226	0	0	0	3,296
1990	0	0	0	0	208	973	1,482	879	538	52	0	0	4,132
1991	0	0	0	3	23	149	719	342	262	0	0	0	1,498
1992	0	0	0	0	35	659	405	754	371	0	0	0	2,224
1993	0	0	0	0	226	908	608	867	53	0	0	0	2,662
1994	0	0	0	0	111	736	499	519	180	0	0	0	2,045
1995	0	0	0	0	236	1,255	1,059	470	29	0	0	0	3,049
1996	0	0	0	0	430	1,267	1,232	358	188	0	0	0	3,476
1997	0	0	0	0	70	1,874	1,739	271	65	0	0	0	4,019
1998	0	0	0	0	1,304	1,677	390	359	317	0	0	0	4,048
1999	0	0	0	0	1,958	1,513	547	488	31	0	0	0	4,537
2000	0	0	0	0	0	16	151	326	191	0	0	0	683
2001	0	0	0	0	105	1,439	1,565	391	207	0	0	0	3,708
2002	0	0	0	0	23	95	240	558	228	0	0	0	1,143
2003	0	0	0	0	98	126	68	344	284	0	0	0	921
2004	0	0	0	0	0	667	873	1,370	219	0	0	0	3,130
2005	0	0	0	11	84	731	472	828	118	0	0	0	2,245
2006	0	0	0	0	195	138	414	1,447	182	115	0	0	2,491
2007	0	0	0	0	26	11	290	579	224	0	0	0	1,130
2008	0	0	0	0	0	1,136	381	836	171	0	0	0	2,524
2009	0	0	0	0	0	110	233	44	0	0	0	0	387
2010	0	0	0	0	89	391	320	398	0	0	0	0	1,198
2011	0	0	0	0	0	4	499	395	106	0	0	0	1,004
2012	0	0	0	0	6	0	100	9	35	0	0	0	149
2013	0	0	0	18	20	5	1	0	0	0	0	0	43
2014	0	0	0	1	115	50	0	0	0	0	0	0	166

YEAR	MONTH												Year Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
NS Average Landings (t)	0	0	0	1	298	928	745	529	160	12	9	2	2,684
NS Minimum Landings (t)	0	0	0	0	0	0	0	0	0	0	0	0	43
NS Maximum Landings (t)	0	0	0	18	1,958	3,704	2,990	1,447	538	136	198	79	7,858

Table 11. Annual landings (t), number of active weirs (defined here as weirs with catch), and the catch per weir (t) for New Brunswick and Nova Scotia weirs from 1978 to 2014.

Year	Annual Landings (t)			No. Active Weirs			Catch per weir (t)		
	NB	NS	Total Landings	NB	NS	Total No.	NB	NS	Average
1978	33,599	7,858	41,458	208	31	239	162	253	173
1979	32,579	6,339	38,918	210	27	237	155	235	164
1980	11,066	2,383	13,449	120	29	149	92	82	90
1981	14,968	1,824	16,793	147	28	175	102	65	96
1982	22,181	1,130	23,311	159	19	178	140	59	131
1983	12,568	896	13,464	143	23	166	88	39	81
1984	8,353	2,702	11,056	116	13	129	72	208	86
1985	26,718	4,055	30,774	156	14	170	171	290	181
1986	27,516	1,957	29,473	105	18	123	262	109	240
1987	26,621	6,776	33,397	123	21	144	216	323	232
1988	38,235	7,480	45,715	191	21	212	200	356	216
1989	43,520	3,296	46,817	171	20	191	255	165	245
1990	39,808	4,132	43,940	154	22	176	258	188	250
1991	23,717	1,498	25,216	143	20	163	166	75	155
1992	31,981	2,224	34,206	151	12	163	212	185	210
1993	31,328	2,662	33,990	145	10	155	216	266	219
1994	20,618	2,045	22,662	129	11	140	160	186	162
1995	18,228	3,049	21,277	106	10	116	172	305	183
1996	15,781	3,476	19,257	101	12	113	156	290	170
1997	20,396	4,019	24,415	102	15	117	200	268	209
1998	19,529	4,048	23,577	108	15	123	181	270	192
1999	19,063	4,537	23,600	100	14	114	191	324	207
2000	16,376	683	17,058	77	3	80	213	228	213
2001	20,064	3,708	23,772	101	14	115	199	265	207
2002	11,807	1,143	12,950	83	9	92	142	127	141
2003	9,003	921	9,924	78	8	86	115	115	115
2004	20,620	3,130	23,750	84	8	92	245	391	258
2005	12,639	2,245	14,884	76	10	86	166	225	173
2006	11,641	2,491	14,132	89	6	95	131	415	149
2007	30,145	1,130	31,275	97	8	105	311	141	298
2008	6,041	2,524	8,565	76	8	84	79	315	102
2009	3,603	387	3,990	38	7	45	95	55	89
2010	10,671	1,198	11,868	77	8	85	139	150	140
2011	2,643	1,004	3,647	37	2	39	71	502	94
2012	494	149	643	4	2	6	124	75	107
2013	5,902	43	5,945	49	3	52	120	14	114
2014	1,571	166	1,737	26	3	29	60	55	60
Average	18,962	2,684	21,646	110	14	124	163	206	166

Table 12. Annual effort with number of days fished, number of active boats, total landings (t), average catch per day (t), and average catch per boat (t) for 1989 to 2014 herring purse seine boats from all areas in 4WX-5Y.

Year	No. Days Fished	No. of Boats Fishing	Total Landings t	CPUE (catch/day)	CPUE (catch/boat)	TAC
1989	2,198	40	87,383	40	2,185	151,200
1990	2,390	42	103,537	43	2,465	151,200
1991	2,333	40	88,830	38	2,221	151,200
1992	2,431	39	95,072	39	2,438	125,000
1993	2,542	36	92,828	37	2,579	151,200
1994	2,227	36	75,652	34	2,101	151,200
1995	1,682	32	56,441	34	1,764	80,000
1996	1,781	32	60,038	34	1,876	57,000
1997	1,731	30	61,769	36	2,059	57,000
1998	2,290	28	70,931	31	2,533	90,000
1999	1,775	28	78,574	44	2,806	105,000
2000	1,572	28	78,727	50	2,812	100,000
2001	1,826	21	75,343	41	3,588	78,000
2002	1,838	19	76,210	41	4,011	78,000
2003	1,652	18	85,499	52	4,750	93,000
2004	1,358	18	76,361	56	4,242	83,000
2005	945	16	48,517	51	3,032	50,000
2006	789	16	44,476	56	2,780	50,000
2007	914	16	50,667	55	3,167	50,000
2008	923	15	53,019	57	3,535	55,000
2009	1,099	14	62,162	57	4,440	55,000
2010	989	14	55,890	57	3,992	55,000
2011	896	14	58,316	65	4,165	50,000
2012	717	14	47,486	66	3,392	50,000
2013	790	12	47,810	61	3,984	50,000
2014	718	11	47,835	67	4,349	50,000

CPUE - catch per unit effort.

Table 13. Summary of the minimum observed SSB for each of the surveyed spawning grounds in the SWNS/BoF component of the 4WX stock complex. Total SSB is rounded to nearest 100t (except 2013 and 2014) and all data was calculated with the use of the CIF (Singh et al. 2014a). Shaded rows = sub-totals and totals. A dash (-) indicates no data; 'n/s' indicates no survey.

Location/Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average 2005 - 2010	Average 1999 - 2014
Scots Bay (inbox)	45,909	185,498	216,000	129,300	123,000	115,000	21,200	31,600	50,500	23,300	81,600	42,300	105,600	143,500	66,912	226,122	41,750	100,463
Scots Bay (outbox)	-	-	-	-	-	-	-	-	2,200	100	6,100	11,700	35,100	41,300	9,306	4,808	5,025	13,824
Scots Bay total	45,909	185,498	216,000	129,300	123,000	115,000	21,200	31,600	52,700	23,400	87,700	54,000	140,700	184,800	76,218	230,930	45,100	107,375
German Bank (inbox)	495,360	333,940	257,300	416,200	348,800	392,000	268,600	290,500	495,400	238,600	395,900	234,700	289,000	278,300	253,921	230,252	320,617	326,075
German Bank (outbox)	-	-	-	-	-	-	-	4,900	4,000	2,400	1,700	19,100	11,500	10,100	10,606	2,782	6,420	7,464
German Bank total	495,360	333,940	257,300	416,200	348,800	392,000	268,600	295,400	499,400	241,000	397,600	253,800	300,500	288,400	264,527	233,034	325,967	330,274
Trinity Ledge	4,061	1,336	14,800	8,900	12,100	12,000	10,700	16,100	3,100	500	1,600	2,400	7,300	2,800	949	4,772	5,733	6,462
Spec Buoy (spring)	-	-	1,100	-	1,200	n/s	600	n/s	300	0	-	1,900	300	n/s	n/s	n/s	700	769
Spec Buoy (fall)	-	-	87,500	-	-	-	-	30	-	-	-	-	-	-	-	-	30	43,765
Overall Stock Area	545,330	520,774	576,700	554,400	485,100	519,000	301,100	343,130	555,500	264,900	486,900	312,100	448,800	476,000	341,694	468,736	377,272	450,010
Seal Island	-	-	3,900	1,200	11,900	-	-	10,000	-	-	-	-	1,500	-	-	-	10,000	5,700
Browns Bank	-	-	45,100	-	-	-	-	7,700	-	-	-	-	-	-	-	-	7,700	26,400
Total All Areas	545,330	520,774	625,700	555,600	497,000	519,000	301,100	360,830	555,500	264,900	486,900	312,100	450,300	476,000	341,694	468,736	380,222	455,091
Overall SE t	89,024	70,347	30,539	65,978	86,276	79,366	82,593	57,484	132,719	38,284	94,294	39,863	60,406	44,705	80,057	92,840	74,206	71,548
Overall SE %	16	14	5	12	17	15	27	16	24	14	19	13	13	9	23	20	19	16

Location/Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Long term Avg since 1999	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010	450,010
Difference from Long term	95,319	70,764	126,690	104,390	35,090	68,990	**-148,910**	**-106,880**	105,490	**-185,110**	36,890	**-137,910**	**-1,210**	25,990	**-108,316**	18,726
% difference from Long term	21%	16%	28%	23%	8%	15%	**-33%**	**-24%**	23%	**-41%**	8%	**-31%**	0%	6%	**-24%**	4%

Table 14. Relative exploitation rates (%) by major spawning grounds and for the overall SWNS/BoF component with (A1) acoustic survey SSB, (A2) acoustic survey proportion of total SSB, (C1) catch by spawning component areas, (C2) adjusted catch including non-spawning area landings, (E1) exploitation rate as percentage of acoustic SSB for spawning area landings, and (E2) adjusted landings.

A1) Acoustic Survey SSB (t)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Avg 99-14**
Scots Bay	160,168	72,473	40,972	106,316	163,900	141,000	133,900	107,600	16,800	28,600	45,700	19,400	67,600	45,419	140,712	184,829	76,218	226,124	96,568
Trinity	23,000	6,762	3,885	621	14,800	8,100	14,500	6,500	5,100	8,500	1,400	300	700	1,026	7,316	2,754	949	4,772	5,076
German Bank	385,400	442,033	460,823	356,372	282,400	394,357	357,100	367,600	211,000	249,600	337,300	201,700	308,700	205,423	300,461	288,443	264,527	233,034	301,177
Total SSB	568,568	521,268	505,680	463,309	461,100	543,457	505,500	481,700	232,900	286,700	384,400	221,400	377,000	251,868	448,771	476,026	341,694	463,930	402,840

A2) Acoustic Survey Proportions	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Avg 99-14**
Scots Bay	28%	14%	8%	23%	36%	26%	26%	22%	7%	10%	12%	9%	18%	18%	31%	39%	22%	49%	22%
Trinity	4%	1%	1%	0%	3%	1%	3%	1%	2%	3%	0%	0%	0%	0%	2%	1%	0%	1%	1%
German Bank	68%	85%	91%	77%	61%	73%	71%	76%	91%	87%	88%	91%	82%	82%	67%	61%	77%	50%	76%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

C1) Landings by Spawn Area	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Avg 99-14**
Scots Bay	4,894	8,210	1,788	10,926	10,739	8,202	19,196	24,869	6,239	3,352	4,116	2,373	902	4,165	5,130	4,940	4,786	4,498	7,264
Trinity (purse seine+gillnet)	8,820	4,512	2,526	843	1,271	1,865	369	595	2,014	4,444	1,203	15	442	820	2,566	1,433	426	1,932	1,423
German Bank	13,576	20,556	24,660	25,631	24,139	22,355	21,573	14,175	14,171	16,522	15,085	22,437	19,354	17,859	21,513	30,253	13,308	14,126	19,822
Spawn Area Total	27,290	33,278	28,974	37,400	36,149	32,422	41,138	39,639	22,424	24,318	20,404	24,825	20,698	22,844	29,209	36,626	18,520	20,556	28,509
Overall SW Nova Landings	56,117	77,027	77,552	85,284	71,570	77,054	89,461	78,029	48,981	49,159	50,529	54,561	54,113	45,534	50,010	47,614	46,601	50,250	61,109
Non-spawning area landings remaining	28,827	43,749	48,578	47,884	35,421	44,632	48,323	38,390	26,557	24,841	30,125	29,736	33,415	22,690	20,802	10,988	28,081	29,694	32,510

C2) Adjusted Landings by Area	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Avg 99-14**
Scots Bay	13,015	14,293	5,725	21,914	23,330	19,782	31,996	33,444	8,155	5,830	7,697	4,979	6,894	8,257	11,652	9,207	11,050	19,018	14,308
Trinity	9,986	5,080	2,899	907	2,408	2,530	1,755	1,113	2,596	5,181	1,313	55	504	913	2,905	1,497	504	2,238	1,832
German Bank	33,116	57,655	68,929	62,462	45,832	54,742	55,710	43,472	38,231	38,148	41,519	49,527	46,715	36,364	35,440	36,911	35,047	28,994	44,878
Adjusted Landings Total	56,117	77,027	77,552	85,284	71,570	77,054	89,461	78,029	48,981	49,159	50,529	54,561	54,113	45,534	49,997	47,614	46,601	50,250	61,018

E1) Exploitation rate (C1/SSB)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Avg 99-14**
Scots Bay	3%	11%	4%	10%	7%	6%	14%	23%	37%	12%	9%	12%	1%	9%	4%	3%	6%	2%	10%
Trinity	38%	67%	65%	136%	9%	23%	3%	9%	39%	52%	86%	5%	63%	80%	35%	52%	45%	40%	46%
German Bank	4%	5%	5%	7%	9%	6%	6%	4%	7%	7%	4%	11%	6%	9%	7%	10%	5%	6%	7%
Overall (C1/SSB)	5%	6%	6%	8%	8%	6%	8%	8%	10%	8%	5%	11%	5%	9%	7%	8%	5%	4%	7%

E2) Exploitation rate adjusted (C2/SSB)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Avg 99-14**
Scots Bay	8%	20%	14%	21%	14%	14%	24%	31%	49%	20%	17%	26%	10%	18%	8%	5%	14%	8%	18%
Trinity	43%	75%	75%	146%	16%	31%	12%	17%	51%	61%	94%	18%	72%	89%	40%	54%	53%	47%	55%
German Bank	9%	13%	15%	18%	16%	14%	16%	12%	18%	15%	12%	25%	15%	18%	12%	13%	13%	12%	15%
Overall Adjusted (Landings/Acoustic SSB)	10%	15%	15%	18%	16%	14%	18%	16%	21%	17%	13%	25%	14%	18%	11%	10%	14%	11%	15%

Table 15A. Summary of biological samples by gear and month as collected during the 2013 4VWX herring fisheries. '# LF Samples' is the number of length frequency samples collected, '# Measured' is the number of lengths taken, and '# Processed' is the number of detail fish with sex and maturity determined.

Gear Name	Data	Month											Total
		1	2	3	5	6	7	8	9	10	11	12	
4W Purse Seine	# LF Samples	0	0	0	10	7	0	0	0	0	0	0	17
	# Measured	0	0	0	1,356	870	0	0	0	0	0	0	2,226
	# Aged	0	0	0	110	28	0	0	0	0	0	0	138
	# Processed	0	0	0	110	28	0	0	0	0	0	0	138
5Y CAN P.Seine	# LF Samples	0	0	0	40	28	0	0	14	18	0	0	100
	# Measured	0	0	0	7,947	5,333	0	0	2,626	3,446	0	0	19,352
	# Aged	0	0	0	105	65	0	0	12	20	0	0	202
	# Processed	0	0	0	105	65	0	0	12	20	0	0	202
5Y USA P.Seine/MWT	# LF Samples	3	1	0	0	4	15	30	0	6	0	0	59
	# Measured	598	197	0	0	639	2,377	4,741	0	1,036	0	0	9,588
	# Aged	0	0	0	0	0	0	0	0	0	0	0	0
	# Processed	0	0	0	0	0	0	0	0	0	0	0	0
5Z USA P.Seine/MWT	# LF Samples	52	34	15	0	0	2	1	0	0	0	28	132
	# Measured	8,482	5,674	2,516	0	0	322	172	0	0	0	4,507	21,673
	# Aged	0	0	0	0	0	0	0	0	0	0	0	0
	# Processed	0	0	0	0	0	0	0	0	0	0	0	0
Gillnet	# LF Samples	0	0	0	0	0	0	2	7	10	0	0	19
	# Measured	0	0	0	0	0	0	308	876	1,209	0	0	2,393
	# Aged	0	0	0	0	0	0	123	235	163	0	0	521
	# Processed	0	0	0	0	0	0	123	237	163	0	0	523
N.B. Purse Seine	# LF Samples	0	0	0	0	89	153	56	36	108	14	0	456
	# Measured	0	0	0	0	17,576	30,963	10,760	6,993	21,100	2,921	0	90,313
	# Aged	0	0	0	0	96	142	69	11	90	10	0	418
	# Processed	0	0	0	0	96	144	69	11	90	10	0	420
N.B. Shut-off	# LF Samples	0	0	0	0	3	7	6	4	3	0	0	23
	# Measured	0	0	0	0	488	1,174	962	706	546	0	0	3,876
	# Aged	0	0	0	0	11	14	0	19	0	0	0	44
	# Processed	0	0	0	0	11	14	0	19	0	0	0	44
N.B. Weirs	# LF Samples	0	0	0	0	20	47	56	42	37	0	0	202
	# Measured	0	0	0	0	3,306	7,756	9,068	7,153	6,330	0	0	33,613
	# Aged	0	0	0	0	33	79	101	63	72	0	0	348
	# Processed	0	0	0	0	33	79	101	63	72	0	0	348
N.S. Purse Seine	# LF Samples	0	0	0	1	139	174	229	159	56	0	0	758
	# Measured	0	0	0	221	26,334	32,659	43,719	31,777	10,998	0	0	145,708
	# Aged	0	0	0	0	255	474	293	249	47	0	0	1,318
	# Processed	0	0	0	0	255	474	293	249	47	0	0	1,318
Resrch. Otter Trawl	# LF Samples	0	7	42	0	0	130	0	0	2	0	0	181
	# Measured	0	0	0	0	0	105	0	0	207	0	0	312
	# Aged	0	23	436	0	0	894	0	0	113	0	0	1,466
	# Processed	0	23	436	0	0	905	0	0	113	0	0	1,477
Total # LF Samples		55	42	57	51	290	528	380	262	240	14	28	1,947
Total # Measured		9,080	5,871	2,516	9,524	54,546	75,356	69,730	50,131	44,872	2,921	4,507	329,054
Total # Aged		0	23	436	215	488	1,603	586	589	505	10	0	4,455
Total # Processed		0	23	436	215	488	1,616	586	591	505	10	0	4,470

Table 15B. Summary of biological samples by gear and month as collected during the 2014 4VWX herring fisheries. '# LF Samples' is the number of length frequency samples collected, '# Measured' is the number of lengths taken, and '# Processed' is the number of detail fish with sex and maturity determined.

Gear Name	Data	Month											Total
		1	2	3	5	6	7	8	9	10	11	12	
4W Purse Seine	# LF Samples	0	0	0	1	0	0	0	0	0	0	0	1
	# Measured	0	0	0	144	0	0	0	0	0	0	0	144
	# Aged	0	0	0	26	0	0	0	0	0	0	0	26
	# Processed	0	0	0	26	0	0	0	0	0	0	0	26
5Y CAN P.Seine	# LF Samples	0	0	0	31	89	125	55	24	0	0	0	324
	# Measured	0	0	0	6,389	16,536	24,154	10,321	4,847	0	0	0	62,247
	# Aged	0	0	0	104	139	281	145	66	0	0	0	735
	# Processed	0	0	0	105	139	281	145	66	0	0	0	736
5Y USA P.Seine/MWT	# LF Samples	0	0	1	0	5	13	22	13	4	0	0	58
	# Measured	0	0	156	0	807	2,077	3,377	2,051	663	0	0	9,131
	# Aged	0	0	0	0	0	67	14	28	26	0	0	135
	# Processed	0	0	0	0	0	67	14	28	26	0	0	135
5Z USA P.Seine/MWT	# LF Samples	60	38	5	1	5	1	1	0	0	0	22	133
	# Measured	9,800	5,946	883	160	810	166	154	0	0	0	3,486	21,405
	# Aged	0	0	0	0	0	0	0	0	0	0	0	0
	# Processed	0	0	0	0	0	0	0	0	0	0	0	0
Gillnet	# LF Samples	0	0	0	0	0	0	0	19	10	0	0	29
	# Measured	0	0	0	0	0	0	0	2,510	1,108	0	0	3,618
	# Aged	0	0	0	0	0	0	0	257	207	0	0	464
	# Processed	0	0	0	0	0	0	0	641	550	0	0	1,191
N.B. Purse Seine	# LF Samples	0	0	0	0	0	0	8	2	48	14	0	72
	# Measured	0	0	0	0	0	0	1,575	399	9,499	2,733	0	14,206
	# Aged	0	0	0	0	0	0	19	11	56	10	0	96
	# Processed	0	0	0	0	0	0	19	11	56	10	0	96
N.B. Shut-off	# LF Samples	0	0	0	0	0	2	14	5	0	0	1	22
	# Measured	0	0	0	0	0	331	2,394	719	0	0	157	3,601
	# Aged	0	0	0	0	0	7	103	18	0	0	0	128
	# Processed	0	0	0	0	0	7	103	18	0	0	0	128
N.B. Weirs	# LF Samples	0	0	0	0	5	11	10	21	25	0	0	72
	# Measured	0	0	0	0	827	1,737	1,543	3,490	4,116	0	0	11,713
	# Aged	0	0	0	0	0	86	8	123	89	0	0	306
	# Processed	0	0	0	0	0	86	8	124	89	0	0	307
N.S. Purse Seine	# LF Samples	0	0	0	24	160	159	275	189	38	0	0	845
	# Measured	0	0	0	4,627	30,121	29,975	52,771	35,936	7,482	0	0	160,912
	# Aged	0	0	0	98	284	471	721	513	85	0	0	2,172
	# Processed	0	0	0	98	384	616	925	591	85	0	0	2,699
Resrch. Otter Trawl	# LF Samples	0	17	66	0	0	66	39	2	1	0	0	191
	# Measured	0	0	0	0	0		110	110	50	0	0	270
	# Aged	0	111	558	0	0	625	308	19	49	0	0	1,670
	# Processed	0	111	589	0	0	632	308	19	50	0	0	1,709
Otter Trawl	# LF Samples	0	0	0	0	0	0	1	0	0	0	0	1
	# Measured	0	0	0	0	0	0	245	0	0	0	0	245
	# Aged	0	0	0	0	0	0	29	0	0	0	0	29
	# Processed	0	0	0	0	0	0	29	0	0	0	0	29
Total # LF Samples		60	55	72	57	264	377	425	275	126	14	23	1,748
Total # Measured		9,800	5,946	1,039	11,320	49,101	58,440	72,490	50,062	22,918	2,733	3,643	287,492
Total # Aged		0	111	558	228	423	1,537	1,347	1,035	512	10	0	5,761
Total # Processed		0	111	589	229	523	1,689	1,551	1,498	856	10	0	7,056

Table 16. Number of herring samples from 4VWX-5Y collected by DFO personnel from commercial fisheries (Commercial), by members of the fishing industry (Industry), observer program (Observer), independent observers on foreign vessels for Over-the-Side Sales or from newly implemented Dockside Monitoring Program (OSS/DMP), and DFO research surveys (Research).

	Sample Source					
Year	**DFO**	**Industry**	**Observer***	**OSS/DMP^**	**Research**	**Total**
1990	422	0	0	185	0	607
1991	448	0	0	167	1	616
1992	330	0	0	205	1	536
1993	183	0	0	421	0	604
1994	223	0	0	228	14	465
1995	138	0	0	244	108	490
1996	127	868	49	0	69	1,113
1997	78	1,443	0	0	114	1,635
1998	225	1,376	0	0	98	1,699
1999	49	1,388	89	0	198	1,724
2000	34	1,387	108	0	177	1,706
2001	47	1,455	96	0	190	1,788
2002	17	1,339	84	0	181	1,621
2003	58	1,292	56	0	199	1,605
2004	50	1,270	60	0	105	1,485
2005	48	1,017	23	0	152	1,240
2006	33	1,049	70	0	99	1,251
2007	10	1,139	29	0	137	1,315
2008	16	781	17	0	130	944
2009	26	980	21	0	135	1,162
2010	29	947	38	146	209	1,369
2011	21	862	15	743	191	1,832
2012	6	594	30	668	204	1502
2013	2	976	11	779	190	1958
2014	3	835	10	707	203	1758
Average	105	839	32	180	124	1281

*2009-2014 Observer samples in observer database only.

^DMP with 100% coverage for purse seine in the Bay of Fundy began August 2010.

Table 17A. Herring catch at age by gear component and overall for the quota year for the 2012-2013 fisheries conducted on the SWNS/BoF spawning component (4WX stock). There was no purse seine winter fishery. A dash (-) indicates no data.

2012 Fall Purse Seine – Qutoa Year 12-13 (358t)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	1	467	1,169	1,041	321	229	109	16	12	7	8	3,381
% numbers	0%	14%	35%	31%	9%	7%	3%	0%	0%	0%	0%	100%
Catch wt. (t)	0	28	98	114	47	40	21	4	3	2	2	358
% catch wt.	0%	8%	27%	32%	13%	11%	6%	1%	1%	1%	1%	100%
Avg. len (cm)	14.6	20.4	22.7	24.6	26.9	28.3	29.3	30.6	31.3	31.9	32.0	24.1
Avg. wt. (g)	19.3	58.9	83.5	109.4	147.4	173.5	195.0	225.1	242.2	256.7	260.3	105.9

4X BOF Summer Purse Seine (44,884t)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	4	147,797	91,501	37,335	54,213	52,051	23,495	9,075	1,554	306	377	417,708
% numbers	0%	35%	22%	9%	13%	12%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	0	9,627	7,981	4,566	7,732	8,385	4,274	1,788	336	89	105	44,884
% catch wt.	0%	21%	18%	10%	17%	19%	10%	4%	1%	0%	0%	100%
Avg. len (cm)	14.3	20.7	22.6	25.1	26.4	27.4	28.4	29.1	30.0	32.8	32.4	23.8
Avg. wt. (g)	20.5	65.1	87.2	122.3	142.6	161.1	181.9	197.0	216.2	292.2	277.7	107.5

4X BOF Stock Gillnet (1,270t)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	-	-	26	511	1,664	2,763	1,494	671	75	0	0	7,205
% numbers	0%	0%	0%	7%	23%	38%	21%	9%	1%	0%	0%	100%
Catch wt. (t)	-	-	3	79	271	487	281	131	16	0	0	1,270
% catch wt.	0%	0%	0%	6%	21%	38%	22%	10%	1%	0%	0%	100%
Avg. len (cm)	-	-	25.8	27.0	27.4	28.0	28.6	29.0	29.5	30.7	31.0	28.0
Avg. wt. (g)	-	-	133.2	155.2	163.1	176.4	187.7	195.9	209.6	234.9	241.9	176.2

Nova Scotia Weirs (43t)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	0	39	70	57	85	76	37	13	3	0	0	379
% numbers	0%	10%	18%	15%	22%	20%	10%	3%	1%	0%	0%	100%
Catch wt. (t)	0	2	5	6	11	11	6	2	1	0	0	43
% catch wt.	0%	4%	12%	14%	25%	25%	14%	5%	1%	0%	0%	100%
Avg. len (cm)	10.7	18.6	21.9	24.8	26.0	27.0	28.2	28.8	30.1	32.5	-	24.9
Avg. wt. (g)	7.7	45.5	73.9	107.2	125.6	140.5	161.8	173.3	199.9	253.1	-	114.0

2013 SWNS/BOF Stock Component (46,554t)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	4	147,836	92,064	39,072	57,004	55,211	25,255	9,867	1,649	319	393	428,673
% numbers	0%	34%	21%	9%	13%	13%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	0	9,628	8,017	4,749	8,128	8,931	4,600	1,943	356	93	109	46,554
% catch wt.	0%	21%	17%	10%	17%	19%	10%	4%	1%	0%	0%	100%
Avg. len (cm)	-	20.7	22.6	25.1	26.4	27.4	28.4	29.1	30.0	32.7	32.4	23.8
Avg. wt. (g)	20.5	65.1	87.1	121.5	142.6	161.8	182.2	196.9	216.0	290.2	276.9	108.6

Table 17B. Herring catch at age by gear component and overall for the quota year for the 2013-2014 fisheries conducted on the SWNS/BoF spawning component (4WX stock). A dash (-) indicates no data

2013 Fall Purse Seine – Quota YearR 13-14 (1,460t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	58	23,123	1,324	169	122	61	15	2	0	-	-	24,874
% numbers	0%	93%	5%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	1	1,297	114	20	15	9	2	0	0	-	-	1,460
% catch wt.	0%	89%	8%	1%	1%	1%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	15.4	20.3	23.2	25.6	26.1	27.2	27.7	28.7	29.5	-	-	20.5
Avg. wt. (g)	22.4	56.1	86.4	118.6	126.4	144.4	152.7	170.0	186.2	-	-	58.7
4X BOF Summer Purse Seine (46,552t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	64	135,984	105,595	46,420	26,495	49,562	32,095	10,216	3,072	468	87	410,057
% numbers	0%	33%	26%	11%	6%	12%	8%	2%	1%	0%	0%	100%
Catch wt. (t)	1	7,603	10,847	6,303	4,190	8,573	6,042	2,141	679	116	26	46,522
% catch wt.	0%	16%	23%	14%	9%	18%	13%	5%	1%	0%	0%	100%
Avg. len (cm)	15.4	19.6	23.6	25.6	26.9	27.6	28.3	29.2	29.7	30.6	32.1	23.8
Avg. wt. (g)	23.0	55.9	102.7	135.8	158.2	173.0	188.3	209.5	221.0	248.5	293.6	113.5
4X BOF Stock Gillnet (2,102t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	-	1,075	3,677	2,506	2,866	1,149	398	128	-	6	11,804
% numbers	0%	0%	9%	31%	21%	24%	10%	3%	1%	0%	0%	100%
Catch wt. (t)	-	-	159	592	445	555	237	83	29	-	1	2,102
% catch wt.	0%	0%	8%	28%	21%	26%	11%	4%	1%	0%	0%	100%
Avg. len (cm)	-	-	26.2	26.8	27.6	28.3	28.9	29.0	29.6	-	31.0	27.6
Avg. wt. (g)	-	-	148.1	161.0	177.6	193.7	206.7	209.5	226.1	-	262.8	178.1
Nova Scotia weirs (166t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	6	103	711	248	110	233	101	28	7	0	-	1,547
% numbers	0%	7%	46%	16%	7%	15%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	0	4	62	28	15	34	16	5	1	0	-	166
% catch wt.	0%	2%	37%	17%	9%	21%	10%	3%	1%	0%	0%	100%
Avg. len (cm)	13.9	17.9	23.0	24.8	26.4	27.0	27.8	29.0	28.9	32.5	-	24.2
Avg. wt. (g)	17.0	38.2	86.8	111.2	136.6	147.2	163.8	190.6	188.8	284.9	-	107.2
2014 SWNS/BOF Stock Component (52,250t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	69	136,145	130,504	51,668	29,279	52,784	33,406	10,656	3,209	469	93	448,282
% numbers	0%	30%	29%	12%	7%	12%	7%	2%	1%	0%	0%	100%
Catch wt. (t)	2	7,608	12,366	7,037	4,670	9,178	6,305	2,231	710	117	27	50,250
% catch wt.	0%	15%	25%	14%	9%	18%	13%	4%	1%	0%	0%	100%
Avg. len (cm)	-	19.6	23.0	25.7	26.9	27.7	28.3	29.2	29.7	30.6	32.1	23.7
Avg. wt. (g)	22.5	55.9	94.8	136.2	159.5	173.9	188.7	209.4	221.1	248.5	291.7	112.1

Table 18A. Herring catch at age by month and overall for the season for the 2013 summer purse seine fishery conducted on the SWNS/BoF spawning component (4WX stock). A dash (-) indicates no data.

BOF Purse Seine May (1,449t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	1,685	3,072	2,281	3,059	2,457	954	281	38	-	-	13,826
% numbers	0%	12%	22%	16%	22%	18%	7%	2%	0%	0%	0%	100%
Catch wt. (t)	-	75	223	241	378	335	146	45	7	-	-	1,449
% catch wt.	0%	5%	15%	17%	26%	23%	10%	3%	0%	0%	0%	100%
Avg. len (cm)	-	18.7	21.9	24.7	26.0	26.8	27.7	28.2	28.9	-	-	24.3
Avg. wt. (g)	-	44.5	72.6	105.5	123.5	136.4	152.6	160.9	173.2	-	-	104.8
BOF Purse Seine June (8,471t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	10,723	21,552	8,069	12,889	13,405	6,681	2,277	455	15	79	76,146
% numbers	0%	14%	28%	11%	17%	18%	9%	3%	1%	0%	0%	100%
Catch wt. (t)	-	618	1,532	894	1,746	2,020	1,129	414	93	4	21	8,471
% catch wt.	0%	7%	18%	11%	21%	24%	13%	5%	1%	0%	0%	100%
Avg. len (cm)	-	20.0	21.3	24.6	26.2	27.1	28.1	28.7	29.8	32.5	32.7	24.2
Avg. wt. (g)	-	57.6	71.1	110.7	135.4	150.7	169.0	181.9	204.8	266.6	272.6	111.2
BOF Purse Seine July (11,829t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	45,183	27,906	8,663	15,123	12,228	5,567	2,024	197	63	78	117,033
% numbers	0%	39%	24%	7%	13%	10%	5%	2%	0%	0%	0%	100%
Catch wt. (t)	-	2,754	2,373	1,035	2,172	1,990	1,028	395	44	17	21	11,829
% catch wt.	0%	23%	20%	9%	18%	17%	9%	3%	0%	0%	0%	100%
Avg. len (cm)	-	20.2	22.4	24.8	26.3	27.4	28.5	29.0	30.2	31.8	31.8	23.2
Avg. wt. (g)	-	61.0	85.1	119.4	143.6	162.7	184.6	195.3	223.2	264.3	262.9	101.1
BOF Purse Seine Aug. (11,023t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	2	27,689	14,365	8,815	11,539	16,667	6,708	2,741	613	130	95	89,363
% numbers	0%	31%	16%	10%	13%	19%	8%	3%	1%	0%	0%	100%
Catch wt. (t)	0	1,862	1,379	1,157	1,762	2,796	1,296	570	133	40	27	11,023
% catch wt.	0%	17%	13%	10%	16%	25%	12%	5%	1%	0%	0%	100%
Avg. len (cm)	11.5	20.8	23.2	25.5	26.7	27.5	28.7	29.4	29.8	33.3	32.5	24.6
Avg. wt. (g)	9.6	67.2	96.0	131.3	152.7	167.7	193.3	208.0	217.3	311.7	288.9	123.4
BOF Purse Seine Sept. (8,224t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	34,215	19,051	6,420	8,837	5,036	2,542	1,429	198	80	88	77,895
% numbers	0%	44%	24%	8%	11%	6%	3%	2%	0%	0%	0%	100%
Catch wt. (t)	-	2,441	1,910	840	1,281	874	485	296	47	23	26	8,224
% catch wt.	0%	30%	23%	10%	16%	11%	6%	4%	1%	0%	0%	100%
Avg. len (cm)	-	21.3	23.6	25.6	26.5	28.0	28.8	29.5	30.8	32.9	32.8	23.7
Avg. wt. (g)	-	71.3	100.3	130.9	145.0	173.6	190.8	207.4	237.7	293.6	290.5	105.6
BOF Purse Seine Oct. (3,888t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	3	28,301	5,556	3,087	2,767	2,257	1,043	324	52	19	37	43,446
% numbers	0%	65%	13%	7%	6%	5%	2%	1%	0%	0%	0%	100%
Catch wt. (t)	0	1,877	563	399	394	371	190	67	12	5	10	3,888
% catch wt.	0%	48%	14%	10%	10%	10%	5%	2%	0%	0%	0%	100%
Avg. len (cm)	15.9	21.0	24.0	25.8	26.6	27.8	28.6	29.8	30.6	32.2	32.0	22.7
Avg. wt. (g)	26.8	66.3	101.4	129.3	142.4	164.2	182.5	206.7	227.3	265.6	261.1	89.5
4X BOF Summer Purse Seine (44,884t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	4	147,797	91,501	37,335	54,213	52,051	23,495	9,075	1,554	306	377	417,708
% numbers	0%	35%	22%	9%	13%	12%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	0	9,627	7,981	4,566	7,732	8,385	4,274	1,788	336	89	105	44,884
% catch wt.	0%	21%	18%	10%	17%	19%	10%	4%	1%	0%	0%	100%
Avg. len (cm)	14.3	20.7	22.6	25.1	26.4	27.4	28.4	29.1	30.0	32.8	32.4	23.8
Avg. wt. (g)	20.5	65.1	87.2	122.3	142.6	161.1	181.9	197.0	216.2	292.2	277.7	107.5

Table 18B. Herring catch at age by month and overall for the season for the 2014 summer purse seine fishery conducted on the SWNS/BoF spawning component (4WX stock). A dash (-) indicates no data.

BOF Purse Seine May (1,373t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	18	1,168	7,337	2,300	855	1,648	588	117	30	-	-	14,062
% numbers	0%	8%	52%	16%	6%	12%	4%	1%	0%	0%	0%	100%
Catch wt. (t)	0	45	622	249	112	230	89	21	5	-	-	1,373
% catch wt.	0%	3%	45%	18%	8%	17%	7%	2%	0%	0%	0%	100%
Avg. len (cm)	15.1	18.0	22.9	24.7	26.2	26.7	27.5	28.8	28.7	-	-	23.7
Avg. wt. (g)	21.5	38.4	84.8	108.2	131.0	139.4	152.0	177.8	174.4	-	-	97.7
BOF Purse Seine June (9,015t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	6	659	18,018	10,007	6,710	16,674	8,920	3,140	774	82	-	64,990
% numbers	0%	1%	28%	15%	10%	26%	14%	5%	1%	0%	0%	100%
Catch wt. (t)	0	27	1,784	1,211	987	2,644	1,565	621	153	23	-	9,015
% catch wt.	0%	0%	20%	13%	11%	29%	17%	7%	2%	0%	0%	100%
Avg. len (cm)	15.2	18.1	23.6	25.1	26.7	27.3	28.1	29.1	29.1	32.5	-	26.0
Avg. wt. (g)	22.2	40.4	99.0	121.0	147.1	158.6	175.4	197.9	197.6	284.9	-	138.7
BOF Purse Seine July (10,562t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	26,117	38,815	7,710	4,529	10,281	6,669	1,942	575	46	11	96,695
% numbers	0%	27%	40%	8%	5%	11%	7%	2%	1%	0%	0%	100%
Catch wt. (t)	-	1,300	3,961	1,029	708	1,789	1,237	398	125	11	3	10,562
% catch wt.	0%	12%	38%	10%	7%	17%	12%	4%	1%	0%	0%	100%
Avg. len (cm)	-	19.0	23.6	25.6	26.9	27.8	28.3	29.2	29.8	31.0	33.0	23.6
Avg. wt. (g)	-	49.8	102.0	133.5	156.3	174.0	185.4	205.2	218.3	248.3	306.5	109.2
BOF Purse Seine Aug. (17,216t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	2	30,762	25,732	20,424	11,993	18,721	14,799	4,403	1,467	332	61	128,696
% numbers	0%	24%	20%	16%	9%	15%	11%	3%	1%	0%	0%	100%
Catch wt. (t)	0	1,730	2,823	2,925	1,974	3,471	2,906	951	341	79	18	17,216
% catch wt.	0%	10%	16%	17%	11%	20%	17%	6%	2%	0%	0%	100%
Avg. len (cm)	15.0	19.4	23.8	25.8	26.9	27.9	28.4	29.2	29.9	30.1	32.1	24.8
Avg. wt. (g)	23.5	56.2	109.7	143.2	164.6	185.4	196.3	216.0	232.3	238.4	293.4	133.8
BOF Purse Seine Sept. (6,621t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	3	54,154	12,520	5,595	2,316	2,230	1,116	614	226	9	15	78,799
% numbers	0%	69%	16%	7%	3%	3%	1%	1%	0%	0%	0%	100%
Catch wt. (t)	0	3,128	1,363	839	397	438	245	149	54	3	4	6,621
% catch wt.	0%	47%	21%	13%	6%	7%	4%	2%	1%	0%	0%	100%
Avg. len (cm)	16.0	19.8	23.9	26.3	27.3	28.4	29.4	30.2	30.2	32.0	31.7	21.6
Avg. wt. (g)	27.3	57.8	108.8	150.0	171.5	196.5	219.7	242.1	241.0	293.0	285.0	84.0
BOF Purse Seine Oct. (1,734t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	35	23,123	3,173	383	92	8	2	0	-	-	-	26,816
% numbers	0%	86%	12%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	1	1,374	295	50	13	1	0	0	-	-	-	1,734
% catch wt.	0%	79%	17%	3%	1%	0%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	15.5	20.2	23.0	25.4	25.9	27.4	28.4	29.0	-	-	-	20.6
Avg. wt. (g)	23.6	59.4	93.1	130.0	138.9	168.6	190.6	204.5	-	-	-	64.7
4X BOF Summer Purse Seine (46,522t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	64	135,984	105,595	46,420	26,495	49,562	32,095	10,216	3,072	468	87	410,057
% numbers	0%	33%	26%	11%	6%	12%	8%	2%	1%	0%	0%	100%
Catch wt. (t)	1	7,603	10,847	6,303	4,190	8,573	6,042	2,141	679	116	26	46,522
% catch wt.	0%	16%	23%	14%	9%	18%	13%	5%	1%	0%	0%	100%
Avg. len (cm)	15.4	19.6	23.6	25.6	26.9	27.6	28.3	29.2	29.7	30.6	32.1	23.8
Avg. wt. (g)	23.0	55.9	102.7	135.8	158.2	173.0	188.3	209.5	221.0	248.5	293.6	113.5

Table 19A. Herring catch at age by fishing ground for the 2013 summer purse seine fishery conducted on the SWNS/BoF spawning component (4WX stock). A dash (-) indicates no data.

Purse German Bank (13,308t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	0	6,829	20,086	13,334	18,730	19,107	8,890	3,992	731	220	213	92,134
% numbers	0%	7%	22%	14%	20%	21%	10%	4%	1%	0%	0%	100%
Catch wt. (t)	0	611	2,089	1,748	2,788	3,243	1,712	827	164	66	61	13,308
% catch wt.	0%	5%	16%	13%	21%	24%	13%	6%	1%	0%	0%	100%
Avg. len (cm)	13.0	22.9	23.9	25.6	26.6	27.7	28.8	29.4	30.1	33.0	32.5	26.2
Avg. wt. (g)	13.3	89.4	104.0	131.1	148.9	169.7	192.6	207.1	223.9	300.4	284.7	144.4
Purse GM Banks (4,393t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	11,999	14,173	5,677	6,581	5,089	1,893	517	70	2	6	46,007
% numbers	0%	26%	31%	12%	14%	11%	4%	1%	0%	0%	0%	100%
Catch wt. (t)	-	747	1,041	633	849	723	298	87	13	1	1	4,393
% catch wt.	0%	17%	24%	14%	19%	16%	7%	2%	0%	0%	0%	100%
Avg. len (cm)	-	20.4	21.6	24.8	26.0	26.8	27.7	28.3	29.1	32.0	31.4	23.2
Avg. wt. (g)	-	62.2	73.5	111.5	129.1	142.0	157.3	168.1	183.0	260.8	244.4	95.5
Purse Grand Manan (8,041t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	2	61,838	25,520	5,258	6,171	3,693	1,005	273	22	0	0	103,784
% numbers	0%	60%	25%	5%	6%	4%	1%	0%	0%	0%	0%	100%
Catch wt. (t)	0	3,806	2,048	508	833	551	164	47	4	0	0	8,041
% catch wt.	0%	47%	25%	7%	10%	7%	2%	1%	0%	0%	0%	100%
Avg. len (cm)	16.5	20.3	22.0	24.4	25.9	26.8	27.6	28.0	28.6	30.8	32.0	21.6
Avg. wt. (g)	29.3	61.6	80.3	111.8	135.0	149.2	162.8	171.7	182.5	237.7	268.1	77.5
Purse Scots Bay (4,786t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	2	200	2,746	4,107	7,263	8,788	4,883	1,975	325	57	88	30,433
% numbers	0%	1%	9%	13%	24%	29%	16%	6%	1%	0%	0%	100%
Catch wt. (t)	0	17	287	524	1,078	1,465	911	394	71	16	24	4,786
% catch wt.	0%	0%	6%	11%	23%	31%	19%	8%	1%	0%	0%	100%
Avg. len (cm)	11.5	22.5	23.9	25.4	26.6	27.6	28.7	29.3	30.1	32.2	32.2	27.0
Avg. wt. (g)	9.6	85.7	104.4	127.5	148.5	166.7	186.6	199.4	217.6	274.9	268.7	157.3
Purse Long Island (4,942t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	54,229	12,781	937	614	251	82	25	3	0	0	68,922
% numbers	0%	79%	19%	1%	1%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	-	3,608	1,097	103	78	37	14	5	1	0	0	4,942
% catch wt.	0%	73%	22%	2%	2%	1%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	-	20.9	22.5	24.3	25.5	26.7	27.8	28.6	29.3	30.7	31.0	21.3
Avg. wt. (g)	-	66.5	85.8	110.0	127.1	147.3	168.3	185.3	203.2	235.5	241.9	71.7
Purse Gannet/Dry Ledge (5,903t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	2,520	8,550	5,281	10,028	10,698	4,752	1,621	295	16	47	43,809
% numbers	0%	6%	20%	12%	23%	24%	11%	4%	1%	0%	0%	100%
Catch wt. (t)	-	176	755	648	1,429	1,681	830	305	62	4	13	5,903
% catch wt.	0%	3%	13%	11%	24%	28%	14%	5%	1%	0%	0%	100%
Avg. len (cm)	-	21.1	22.7	25.2	26.4	27.3	28.2	28.8	29.8	32.0	32.4	25.8
Avg. wt. (g)	-	70.0	88.4	122.7	142.5	157.1	174.6	188.1	209.0	267.2	270.4	134.7
BOF Purse Trinity (267t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	1,329	1,267	208	95	69	12	1	-	-	-	2,982
% numbers	0%	45%	42%	7%	3%	2%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	-	99	118	25	13	10	2	0	-	-	-	267
% catch wt.	0%	37%	44%	9%	5%	4%	1%	0%	0%	0%	0%	100%
Avg. len (cm)	-	21.4	23.0	24.9	25.7	26.5	27.2	28.4	-	-	-	22.6
Avg. wt. (g)	-	74.3	93.0	120.6	135.6	148.5	161.9	185.6	-	-	-	89.5
Purse Lurcher (2,872t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	3,342	6,051	2,494	4,703	4,341	1,975	670	108	10	22	23,716
% numbers	0%	14%	26%	11%	20%	18%	8%	3%	0%	0%	0%	100%
Catch wt. (t)	-	232	515	293	660	674	343	123	22	3	6	2,872
% catch wt.	0%	8%	18%	10%	23%	23%	12%	4%	1%	0%	0%	100%
Avg. len (cm)	-	21.1	22.5	24.9	26.3	27.2	28.2	28.7	29.9	32.1	32.5	24.9
Avg. wt. (g)	-	69.4	85.2	117.4	140.3	155.3	173.7	184.2	208.4	259.9	271.0	121.1
BOF Purse NB Coastal (372t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	5,510	327	39	28	14	3	0	0	-	-	5,922
% numbers	0%	93%	6%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	-	331	30	5	4	2	1	0	0	-	-	372
% catch wt.	0%	89%	8%	1%	1%	1%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	-	20.4	23.2	25.6	26.1	27.1	27.7	28.7	29.5	-	-	20.7
Avg. wt. (g)	-	60.1	90.8	125.6	133.6	151.5	162.2	181.9	199.4	-	-	62.8
4X BOF Summer Purse Seine (44,884t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	4	147,797	91,501	37,335	54,213	52,051	23,495	9,075	1,554	306	377	417,708
% numbers	0%	35%	22%	9%	13%	12%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	0	9,627	7,981	4,566	7,732	8,385	4,274	1,788	336	89	105	44,884
% catch wt.	0%	21%	18%	10%	17%	19%	10%	4%	1%	0%	0%	100%
Avg. len (cm)	14.3	20.7	22.6	25.1	26.4	27.4	28.4	29.1	30.0	32.8	32.4	23.8
Avg. wt. (g)	20.5	65.1	87.2	122.3	142.6	161.1	181.9	197.0	216.2	292.2	277.7	107.5

Table 19B. Herring catch at age by fishing ground for the 2014 summer purse seine fishery conducted on the SWNS/BoF spawning component (4WX stock). A dash (-) indicates no data.

Purse - German Bank (14,140t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	5,095	17,773	19,295	11,476	16,832	12,811	4,115	1,399	273	64	89,131
% numbers	0%	6%	20%	22%	13%	19%	14%	5%	2%	0%	0%	100%
Catch wt. (t)	-	288	2,086	2,842	1,908	3,157	2,544	905	326	66	19	14,140
% catch wt.	0%	2%	15%	20%	13%	22%	18%	6%	2%	0%	0%	100%
Avg. len (cm)	-	19.5	24.3	26.1	27.0	28.0	28.5	29.4	29.9	30.2	32.0	26.4
Avg. wt. (g)	-	56.4	117.4	147.3	166.3	187.6	198.6	219.9	233.3	241.2	293.8	158.6
Purse - GM Banks (8,429t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	24	28,724	37,507	8,110	3,480	6,867	3,135	735	174	8	-	88,764
% numbers	0%	32%	42%	9%	4%	8%	4%	1%	0%	0%	0%	100%
Catch wt. (t)	1	1,577	3,599	987	505	1,057	526	141	34	2	-	8,429
% catch wt.	0%	19%	43%	12%	6%	13%	6%	2%	0%	0%	0%	100%
Avg. len (cm)	15.1	19.5	23.2	25.0	26.5	27.0	27.7	28.9	29.0	31.5	-	22.8
Avg. wt. (g)	21.6	54.9	96.0	121.7	145.0	154.0	167.8	192.3	194.5	259.9	-	95.0
Purse - Grand Manan (320t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	18	4,575	483	109	34	20	9	2	0	-	-	5,250
% numbers	0%	87%	9%	2%	1%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	0	249	45	15	5	3	2	0	0	-	-	320
% catch wt.	0%	78%	14%	5%	2%	1%	1%	0%	0%	0%	0%	100%
Avg. len (cm)	15.6	19.5	22.9	25.7	26.5	27.4	27.8	28.5	29.0	-	-	20.0
Avg. wt. (g)	23.9	54.5	93.8	135.0	149.4	167.5	175.3	188.3	200.2	-	-	61.0
Purse - Scots Bay (4,498t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	46	9,083	4,696	2,971	5,764	4,318	1,400	450	77	17	28,823
% numbers	0%	0%	32%	16%	10%	20%	15%	5%	2%	0%	0%	100%
Catch wt. (t)	-	3	1,057	659	478	1,041	835	299	102	19	5	4,498
% catch wt.	0%	0%	23%	15%	11%	23%	19%	7%	2%	0%	0%	100%
Avg. len (cm)	-	21.4	24.5	25.9	26.9	27.9	28.5	29.4	29.9	30.7	32.5	26.6
Avg. wt. (g)	-	75.6	116.3	140.4	160.9	180.6	193.4	213.4	226.0	246.3	296.5	156.1
BOF Purse Long Island (2,607t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	1	37,687	3,859	289	53	2	-	-	-	-	-	41,891
% numbers	0%	90%	9%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	0	2,202	360	37	7	0	-	-	-	-	-	2,607
% catch wt.	0%	84%	14%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	16.0	20.0	22.9	25.3	25.6	26.7	-	-	-	-	-	20.3
Avg. wt. (g)	27.3	58.4	93.4	128.6	132.6	156.2	-	-	-	-	-	62.2
BOF Purse Gannet/Dry Ledge (12,659t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	2	26,858	28,147	11,747	7,419	17,744	10,603	3,606	954	108	6	107,195
% numbers	0%	25%	26%	11%	7%	17%	10%	3%	1%	0%	0%	100%
Catch wt. (t)	0	1,394	2,834	1,491	1,129	2,936	1,920	725	198	29	2	12,659
% catch wt.	0%	11%	22%	12%	9%	23%	15%	6%	2%	0%	0%	100%
Avg. len (cm)	15.1	19.1	23.6	25.3	26.8	27.5	28.2	29.1	29.4	31.7	31.8	24.2
Avg. wt. (g)	23.5	51.9	100.7	127.0	152.2	165.5	181.1	201.0	207.6	267.8	283.2	118.1
BOF Purse Trinity (1,757t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	2	22,880	3,787	355	79	42	15	5	2	-	-	27,166
% numbers	0%	84%	14%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	0	1,310	375	48	12	8	3	1	0	-	-	1,757
% catch wt.	0%	75%	21%	3%	1%	0%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	16.0	19.8	23.3	25.6	26.4	27.7	28.6	29.0	29.6	-	-	20.4
Avg. wt. (g)	27.3	57.2	99.0	136.7	153.1	180.2	200.6	210.0	223.7	-	-	64.7
BOF Purse Lurcher (1,969t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	8,734	4,596	1,692	951	2,267	1,193	351	94	3	-	19,881
% numbers	0%	44%	23%	9%	5%	11%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	-	503	453	207	141	366	211	69	19	1	-	1,969
% catch wt.	0%	26%	23%	11%	7%	19%	11%	3%	1%	0%	0%	100%
Avg. len (cm)	-	19.8	23.5	25.1	26.7	27.3	28.0	28.9	29.2	31.1	-	23.0
Avg. wt. (g)	-	57.6	98.6	122.2	148.5	161.5	176.6	195.6	200.5	251.2	-	99.0
BOF Purse N.B. Coastal (88t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	17	1,367	97	15	5	2	1	0	-	-	-	1,503
% numbers	1%	91%	6%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	0	76	8	2	1	0	0	0	-	-	-	88
% catch wt.	0%	86%	10%	2%	1%	0%	0%	0%	0%	0%	0%	100%
Avg. len (cm)	15.5	19.8	22.5	25.8	26.8	27.9	28.6	29.1	-	-	-	20.0
Avg. wt. (g)	23.3	55.5	86.9	136.5	156.3	177.8	195.5	205.5	-	-	-	58.5
BOF Purse SW Grounds (54t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	19	263	112	26	22	9	1	0	0	-	452
% numbers	-	4%	58%	25%	6%	5%	2%	0%	0	0	-	100%
Catch wt. (t)	-	1	29	14	4	3	1	0	0	0	-	54
% catch wt.	-	3%	54%	27%	7%	6%	3%	1%	0	0	-	100%
Avg. len (cm)	-	21.2	23.9	25.0	26.2	26.0	27.0	28.4	29.0	29.0	-	24.4
Avg. wt. (g)	-	75.1	110.8	129.1	149.3	147.7	168.5	195.8	209.4	209.4	-	119.3
4X BOF Summer Purse Seine (46,522t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	64	135,984	105,595	46,420	26,495	49,562	32,095	10,216	3,072	468	87	410,057
% numbers	0%	33%	26%	11%	6%	12%	8%	2%	1%	0%	0%	100%
Catch wt. (t)	1	7,603	10,847	6,303	4,190	8,573	6,042	2,141	679	116	26	46,522
% catch wt.	0%	16%	23%	14%	9%	18%	13%	5%	1%	0%	0%	100%
Avg. len (cm)	15.4	19.6	23.6	25.6	26.9	27.6	28.3	29.2	29.7	30.6	32.1	23.8
Avg. wt. (g)	23.0	55.9	102.7	135.8	158.2	173.0	188.3	209.5	221.0	248.5	293.6	113.5

Table 20. Herring catch at age for the 2011-2012 (A), 2012-2013 (B), and 2013-2014 (D) quota years for the purse seine, gillnet and weir fisheries conducted on the SWNS/BoF spawning component (4WX stock). Comparisons of herring catch at age for 2011-2012 versus 2012-2013 quota years (C) and 2012-2013 versus 2013-2014 quota years (E). (QY = quota year). (with negative deviations shaded). A dash (-) indicates no data.

A) 2011-2012 QY

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	180	108,205	57,943	118,168	83,644	38,935	18,689	2,559	1,655	1,278	1,042	432,301
% numbers	0%	25%	13%	27%	19%	9%	4%	1%	0%	0%	0%	100%
Catch wt. (t)	4	5,525	4,856	13,813	11,963	6,406	3,469	565	407	329	277	47,614
% catch wt.	0%	12%	10%	29%	25%	13%	7%	1%	1%	1%	1%	100%
Avg. len (cm)	-	19.2	22.5	24.9	26.5	27.7	28.8	30.3	31.4	31.9	32.2	24.0
Avg. wt. (g)	23.2	51.1	83.8	116.9	143.0	164.5	185.6	220.6	245.6	257.6	265.9	110.1

B) 2012-2013 QY

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	4	147,836	92,064	39,072	57,004	55,211	25,255	9,867	1,649	319	393	428,673
% numbers	0%	34%	21%	9%	13%	13%	6%	2%	0%	0%	0%	100%
Catch wt. (t)	0	9,628	8,017	4,749	8,128	8,931	4,600	1,943	356	93	109	46,554
% catch wt.	0%	21%	17%	10%	17%	19%	10%	4%	1%	0%	0%	100%
Avg. len (cm)	-	20.7	22.6	25.1	26.4	27.4	28.4	29.1	30.0	32.7	32.4	23.8
Avg. wt. (g)	20.5	65.1	87.1	121.5	142.6	161.8	182.2	196.9	216.0	290.2	276.9	108.6

C) Differences 2012-2013 QY

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	-176	39,631	34,121	-79,097	-26,641	16,275	6,566	7,308	-6	-960	-649	-3,627
% numbers	-0.00	0.09	0.08	-0.18	-0.06	0.04	0.02	0.02	0.00	-0.00	-0.00	0.00
Catch wt. (t)	-4	4,103	3,161	-9,064	-3,834	2,525	1,131	1,378	-50	-237	-168	-1,060
% catch wt.	-0.00	0.09	0.07	-0.19	-0.08	0.06	0.03	0.03	-0.00	-0.00	-0.00	0.00
Avg. len (cm)	0.0	1.4	0.1	0.2	-0.1	-0.3	-0.3	-1.2	-1.4	0.9	0.2	-0.2
Avg. wt. (g)	-2.7	14.1	3.3	4.7	-0.4	-2.8	-3.5	-23.7	-29.7	32.7	11.0	-1.5

D) 2013-2014 QY

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	69	136,145	130,504	51,668	29,279	52,784	33,406	10,656	3,209	469	93	448,282
% numbers	0%	30%	29%	12%	7%	12%	7%	2%	1%	0%	0%	100%
Catch wt. (t)	2	7,608	12,365	7,037	4,670	9,178	6,305	2,231	710	117	27	50,250
% catch wt.	0%	15%	25%	14%	9%	18%	13%	4%	1%	0%	0%	100%
Avg. len (cm)	-	19.6	23.0	25.7	26.9	27.7	28.3	29.2	29.7	30.6	32.1	23.7
Avg. wt. (g)	22.5	55.9	94.8	136.2	159.5	173.9	188.7	209.4	221.1	248.5	291.7	112.1

E) Differences 2013-2014 QY

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	65	-11,691	38,440	12,597	-27,725	-2,427	8,150	789	1,560	150	-300	19,609
% numbers	0.00	-0.04	0.08	0.02	-0.07	-0.01	0.02	0.00	0.00	0.00	-0.00	0.00
Catch wt. (t)	1	-2,020	4,348	2,288	-3,458	247	1,705	289	353	24	-82	3,696
% catch wt.	0.00	-0.06	0.07	0.04	-0.08	-0.01	0.03	0.00	0.01	0.00	-0.00	0.00
Avg. len (cm)	0.0	-1.1	0.4	0.6	0.5	0.2	-0.1	0.1	-0.3	-2.1	-0.3	-0.1
Avg. wt. (g)	2.0	-9.2	7.7	14.6	16.9	12.1	6.6	12.5	5.2	-41.7	14.8	3.5

Table 21A. Catch at age (millions) for the SWNS/BoF herring spawning component from 1965-2014. Some relatively strong year-classes that persisted in the fishery catch have been shaded.

	Year											
Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11+**	**Total**
1965	-	1,085	35	234	50	11	2	1	0	0	0	1,417
1966	154	914	449	73	322	46	14	8	2	0	0	1,982
1967	722	614	154	266	110	159	58	4	0	0	0	2,089
1968	165	2,389	225	83	290	73	91	32	15	6	1	3,370
1969	109	290	532	132	162	113	63	23	6	3	1	1,433
1970	700	577	77	286	201	120	112	41	21	7	3	2,145
1971	88	404	184	107	114	76	94	50	37	8	6	1,165
1972	-	649	72	149	77	75	49	49	26	14	12	1,172
1973	1	167	781	131	40	30	22	20	24	12	13	1,242
1974	18	766	94	804	68	19	10	7	13	7	9	1,815
1975	3	318	240	125	515	66	12	4	5	4	6	1,298
1976	0	56	207	154	69	269	21	6	4	2	3	790
1977	1	154	32	218	119	51	177	14	3	1	4	775
1978	35	384	41	13	122	68	31	109	11	2	2	819
1979	0	184	250	55	5	23	18	12	41	5	2	596
1980	2	13	81	474	28	4	5	7	3	11	3	629
1981	-	103	51	103	451	33	2	3	2	1	2	751
1982	4	102	151	23	98	211	15	2	1	1	1	609
1983	5	192	150	244	24	61	90	10	2	1	1	781
1984	-	88	244	224	146	23	22	28	10	2	9	796
1985	9	217	338	303	148	42	14	18	8	1	0	1,098
1986	0	125	276	293	57	32	11	4	3	1	0	802
1987	2	83	126	527	243	46	19	7	3	3	1	1,062
1988	0	148	113	195	434	236	43	21	4	4	3	1,202
1989	0	102	114	62	79	169	77	18	8	4	3	636
1990	-	179	130	172	90	101	202	117	31	11	7	1,039
1991	-	97	179	184	88	41	50	81	46	18	14	798
1992	0	169	133	287	127	75	34	35	59	35	21	974
1993	0	76	44	194	131	68	34	21	22	21	11	622
1994	0	104	142	54	118	73	36	15	9	10	16	576
1995	2	113	220	112	37	36	22	6	4	3	4	560
1996	-	37	38	256	55	17	9	3	2	1	2	420
1997	0	57	87	78	131	19	5	4	1	1	1	384
1998	0	265	62	139	97	97	21	4	2	1	0	689
1999	9	151	253	72	104	63	26	6	2	0	1	686
2000	0	378	53	123	109	56	30	12	1	1	0	764
2001	0	81	311	54	64	31	17	5	3	0	0	566
2002	16	310	107	189	84	25	9	6	3	2	2	753
2003	0	479	255	81	109	19	10	3	3	2	1	961
2004	4	322	315	161	40	37	11	2	3	1	2	897
2005	1	66	131	174	59	12	9	4	1	0	1	457
2006	3	112	102	68	82	34	16	4	0	0	0	422
2007	0	186	56	34	39	71	25	7	1	0	0	419
2008	1	78	220	53	25	32	31	11	4	0	0	457
2009	1	263	118	139	22	12	11	13	6	1	0	587
2010	-	482	177	53	63	7	4	4	4	2	1	796
2011	0	60	227	112	50	38	5	2	2	2	1	498
2012	0	108	58	118	84	39	19	3	2	1	1	432
2013	0	148	92	39	57	55	25	10	2	0	0	429
2014	0	136	131	52	29	53	33	11	3	0	0	448

Table 21B. Catch at age (percent by numbers) for the SWNS/BoF herring spawning component, 1965-2014. Proportions for some relatively strong year-classes that persisted in the fishery catch have been shaded. Note: Bold-outlined cell is greater or equal to 50% by number for age group. A dash (-) indicates no data.

	Age											
Year	1	2	3	4	5	6	7	8	9	10	11+	Total
1965	-	77	2	17	4	1	0	0	0	0	0	100
1966	8	46	23	4	16	2	1	0	0	0	0	100
1967	35	29	7	13	5	8	3	0	0	0	0	100
1968	5	71	7	2	9	2	3	1	0	0	0	100
1969	8	20	37	9	11	8	4	2	0	0	0	100
1970	33	27	4	13	9	6	5	2	1	0	0	100
1971	8	35	16	9	10	6	8	4	3	1	0	100
1972	-	55	6	13	7	6	4	4	2	1	1	100
1973	0	13	63	11	3	2	2	2	2	1	1	100
1974	1	42	5	44	4	1	1	0	1	0	0	100
1975	0	24	18	10	40	5	1	0	0	0	0	100
1976	0	7	26	19	9	34	3	1	0	0	0	100
1977	0	20	4	28	15	7	23	2	0	0	1	100
1978	4	47	5	2	15	8	4	13	1	0	0	100
1979	0	31	42	9	1	4	3	2	7	1	0	100
1980	0	2	13	75	4	1	1	1	0	2	0	100
1981	-	14	7	14	60	4	0	0	0	0	0	100
1982	1	17	25	4	16	35	2	0	0	0	0	100
1983	1	25	19	31	3	8	12	1	0	0	0	100
1984	-	11	31	28	18	3	3	4	1	0	1	100
1985	1	20	31	28	13	4	1	2	1	0	0	100
1986	0	16	34	36	7	4	1	1	0	0	0	100
1987	0	8	12	50	23	4	2	1	0	0	0	100
1988	0	12	9	16	36	20	4	2	0	0	0	100
1989	0	16	18	10	12	27	12	3	1	1	0	100
1990	-	17	13	17	9	10	19	11	3	1	1	100
1991	-	12	22	23	11	5	6	10	6	2	2	100
1992	0	17	14	29	13	8	4	4	6	4	2	100
1993	0	12	7	31	21	11	5	3	4	3	2	100
1994	0	18	25	9	20	13	6	3	2	2	3	100
1995	0	20	39	20	7	7	4	1	1	1	1	100
1996	-	9	9	61	13	4	2	1	0	0	0	100
1997	0	15	23	20	34	5	1	1	0	0	0	100
1998	0	38	9	20	14	14	3	1	0	0	0	100
1999	1	22	37	10	15	9	4	1	0	0	0	100
2000	0	49	7	16	14	7	4	2	0	0	0	100
2001	0	14	55	10	11	5	3	1	1	0	0	100
2002	2	41	14	25	11	3	1	1	0	0	0	100
2003	0	50	27	8	11	2	1	0	0	0	0	100
2004	0	36	35	18	4	4	1	0	0	0	0	100
2005	0	15	29	38	13	3	2	1	0	0	0	100
2006	1	26	24	16	19	8	4	1	0	0	0	100
2007	0	44	13	8	9	17	6	2	0	0	0	100
2008	0	17	48	12	5	7	7	2	1	0	0	100
2009	0	45	20	24	4	2	2	2	1	0	0	100
2010	-	60	22	7	8	1	0	1	0	0	0	100
2011	0	12	46	22	10	8	1	0	0	0	0	100
2012	0	25	13	27	19	9	4	1	0	0	0	100
2013	0	34	21	9	13	13	6	2	0	0	0	100
2014	0	30	29	12	7	12	7	2	1	0	0	100

Table 22. Average (fishery weighted) weights at age (g) for the SWNS/BoF component of the 4WX herring fishery for 1965-2014. Data for 1965-1967 and 1979-1983 are averages for the period 1968-1978. Note: years 1965-1967 (except age 11 for 1967)and 1979-1983 have average weights for 1967-2000 applied.

Year	Average Weight (kg)										
	1	2	3	4	5	6	7	8	9	10	11
1965	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1966	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1967	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.392
1968	0.010	0.033	0.112	0.148	0.185	0.244	0.276	0.399	0.338	0.410	0.409
1969	0.010	0.037	0.105	0.162	0.207	0.242	0.282	0.306	0.334	0.390	0.391
1970	0.010	0.032	0.119	0.169	0.211	0.257	0.292	0.332	0.369	0.389	0.389
1971	0.010	0.066	0.143	0.199	0.230	0.254	0.293	0.329	0.362	0.388	0.388
1972	0.010	0.044	0.138	0.192	0.223	0.262	0.292	0.322	0.345	0.380	0.380
1973	0.010	0.029	0.106	0.143	0.225	0.252	0.279	0.331	0.360	0.389	0.389
1974	0.010	0.048	0.110	0.175	0.206	0.240	0.277	0.322	0.342	0.352	0.344
1975	0.010	0.021	0.094	0.179	0.216	0.240	0.268	0.333	0.358	0.379	0.379
1976	0.010	0.033	0.114	0.159	0.233	0.249	0.277	0.317	0.382	0.404	0.404
1977	0.010	0.065	0.113	0.174	0.214	0.274	0.293	0.325	0.328	0.416	0.416
1978	0.010	0.028	0.112	0.181	0.229	0.259	0.302	0.330	0.351	0.397	0.397
1979	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1980	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1981	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1982	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1983	0.010	0.041	0.112	0.172	0.218	0.254	0.286	0.323	0.354	0.389	0.389
1984	0.010	0.038	0.132	0.191	0.229	0.259	0.280	0.296	0.309	0.364	0.364
1985	0.010	0.053	0.118	0.204	0.249	0.278	0.315	0.334	0.344	0.440	0.440
1986	0.010	0.055	0.124	0.182	0.239	0.271	0.306	0.329	0.360	0.400	0.399
1987	0.012	0.050	0.098	0.153	0.199	0.245	0.274	0.290	0.318	0.350	0.349
1988	0.013	0.021	0.088	0.154	0.196	0.242	0.281	0.304	0.327	0.341	0.371
1989	0.007	0.033	0.079	0.162	0.207	0.238	0.274	0.303	0.324	0.353	0.365
1990	0.010	0.031	0.092	0.161	0.200	0.234	0.255	0.287	0.319	0.336	0.364
1991	0.010	0.048	0.100	0.147	0.186	0.217	0.251	0.270	0.303	0.322	0.332
1992	0.009	0.025	0.100	0.148	0.181	0.216	0.252	0.275	0.295	0.313	0.333
1993	0.018	0.029	0.108	0.153	0.188	0.215	0.251	0.279	0.302	0.324	0.357
1994	0.012	0.037	0.079	0.131	0.175	0.203	0.223	0.253	0.289	0.304	0.326
1995	0.015	0.042	0.076	0.136	0.187	0.223	0.247	0.293	0.300	0.326	0.363
1996	0.010	0.033	0.098	0.137	0.168	0.228	0.266	0.308	0.332	0.355	0.384
1997	0.019	0.034	0.080	0.161	0.190	0.238	0.284	0.314	0.358	0.376	0.397
1998	0.010	0.038	0.076	0.131	0.177	0.210	0.251	0.296	0.308	0.337	0.376
1999	0.024	0.052	0.087	0.137	0.166	0.199	0.213	0.243	0.259	0.311	0.274
2000	0.023	0.062	0.095	0.139	0.173	0.198	0.214	0.232	0.270	0.295	0.311
2001	0.023	0.058	0.109	0.147	0.185	0.221	0.249	0.269	0.263	0.317	0.312
2002	0.019	0.045	0.107	0.149	0.176	0.215	0.243	0.251	0.238	0.252	0.274
2003	0.013	0.044	0.090	0.146	0.176	0.196	0.225	0.253	0.250	0.257	0.260
2004	0.011	0.035	0.084	0.136	0.178	0.195	0.204	0.242	0.228	0.249	0.253
2005	0.022	0.035	0.074	0.130	0.153	0.184	0.207	0.214	0.246	0.273	0.254
2006	0.023	0.056	0.091	0.141	0.164	0.181	0.204	0.222	0.252	0.267	0.307
2007	0.027	0.055	0.104	0.148	0.184	0.204	0.215	0.242	0.270	0.269	0.287
2008	0.025	0.050	0.095	0.146	0.175	0.207	0.228	0.240	0.254	0.293	0.325
2009	0.011	0.041	0.085	0.138	0.172	0.203	0.232	0.246	0.257	0.281	0.297
2010	0.010	0.030	0.060	0.119	0.149	0.181	0.209	0.234	0.245	0.253	0.260
2011	0.029	0.054	0.077	0.116	0.145	0.170	0.196	0.231	0.252	0.255	0.274
2012	0.023	0.051	0.084	0.117	0.143	0.165	0.186	0.221	0.246	0.258	0.266
2013	0.021	0.065	0.087	0.122	0.143	0.162	0.182	0.197	0.216	0.290	0.277
2014	0.023	0.056	0.095	0.136	0.160	0.174	0.189	0.209	0.221	0.249	0.292
Average 1965-2014	0.014	0.042	0.101	0.155	0.195	0.228	0.256	0.288	0.309	0.340	0.349
Minimum	0.007	0.021	0.060	0.116	0.143	0.162	0.182	0.197	0.216	0.249	0.253
Maximum	0.029	0.066	0.143	0.204	0.249	0.278	0.315	0.399	0.382	0.440	0.440
Avg 1970-79	0.010	0.041	0.116	0.174	0.221	0.254	0.286	0.326	0.355	0.388	0.387
Avg 1980-89	0.010	0.041	0.109	0.173	0.219	0.255	0.287	0.315	0.340	0.380	0.384
Avg 1990-99	0.014	0.037	0.090	0.144	0.182	0.218	0.249	0.282	0.307	0.330	0.351
Avg 2000-09	0.020	0.048	0.093	0.142	0.174	0.200	0.222	0.241	0.253	0.275	0.288
Avg 2010-14	0.021	0.051	0.081	0.122	0.148	0.170	0.192	0.218	0.236	0.261	0.274
Prev 10yr: 2005 – 2014	0.021	0.049	0.085	0.131	0.159	0.183	0.205	0.226	0.246	0.269	0.284
Prev 5yr: 2010 - 2014	0.021	0.051	0.081	0.122	0.148	0.170	0.192	0.218	0.236	0.261	0.274

Table 23A. Acoustic age composition for the overall SWNS/BoF component from 1999 to 2014. A dash (-) indicates no data.

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total SSB
1999 Acoustics Overall (with CIF)	% catch wt.	0%	0%	4%	14%	35%	30%	11%	3%	1%	0%	0%	100%
2000 Acoustics Overall (with CIF)	% catch wt.	0%	0%	3%	25%	31%	19%	13%	7%	1%	1%	0%	100%
2001 Sub-total Stock Acoustic (with CIF)	% catch wt.	0%	2%	39%	14%	20%	13%	8%	2%	2%	0%	0%	100%
2002 Acoustics Stock Overall (with CIF)	% catch wt.	0%	1%	15%	44%	21%	7%	4%	3%	2%	1%	1%	99%
2003 Overall Acoustics (with CIF)	% catch wt.	0%	1%	28%	21%	34%	7%	4%	1%	1%	1%	1%	99%
2004 Acoustics Overall (with CIF)	% catch wt.	0%	0%	21%	43%	16%	11%	3%	1%	2%	0%	1%	99%
2005 Acoustics Overall (with CIF)	% catch wt.	0%	0%	10%	47%	20%	8%	8%	4%	1%	0%	1%	99%
2006 Acoustics Overall (with CIF)	% catch wt.	0%	0%	8%	21%	37%	19%	11%	3%	0%	0%	0%	100%
2007 Overall Acoustics (with CIF)	% catch wt.	0%	1%	8%	13%	17%	37%	19%	3%	1%	0%	0%	100%
2008 Overall Acoustics (with CIF)	% catch wt.	0%	0%	24%	12%	9%	14%	24%	12%	5%	1%	0%	100%
2009 Acoustics Overall (with CIF)	% catch wt.	0%	1%	17%	49%	8%	5%	7%	8%	4%	1%	0%	100%
2010 All Acoustics (with CIF)	% catch wt.	0%	0%	11%	21%	44%	6%	3%	6%	5%	2%	1%	99%
2011 Acoustics Overall (with CIF)	% catch wt.	0%	2%	18%	30%	23%	21%	2%	1%	1%	1%	0%	100%
2012 Acoustics Overall (with CIF)	% catch wt.	0%	0%	5%	25%	33%	19%	12%	2%	1%	1%	1%	99%
2013 Acoustics Overall (with CIF)	% catch wt.	0%	3%	15%	14%	23%	24%	12%	6%	1%	0%	0%	100%
2014 Acoustics Overall (with CIF)	% catch wt.	0%	0%	20%	18%	11%	21%	18%	8%	3%	1%	0%	100%
1999 Acoustics Overall (with CIF)	% numbers	0%	0%	6%	17%	37%	27%	9%	2%	1%	0%	0%	100%
2000 Acoustics Overall (with CIF)	% numbers	0%	1%	5%	31%	30%	16%	11%	5%	1%	0%	0%	100%
2001 Sub-total Stock Acoustic (with CIF)	% numbers	0%	4%	50%	14%	17%	9%	5%	1%	1%	0%	0%	100%
2002 Acoustics Stock Overall (with CIF)	% numbers	0%	4%	19%	46%	19%	5%	3%	2%	1%	0%	0%	100%
2003 Overall Acoustics (with CIF)	% numbers	0%	2%	37%	21%	28%	6%	3%	1%	1%	0%	0%	100%
2004 Acoustics Overall (with CIF)	% numbers	0%	1%	28%	44%	12%	9%	2%	1%	2%	0%	1%	99%
2005 Acoustics Overall (with CIF)	% numbers	0%	0%	14%	50%	19%	7%	6%	3%	1%	0%	0%	100%
2006 Acoustics Overall (with CIF)	% numbers	0%	0%	12%	23%	37%	17%	9%	2%	0%	0%	0%	100%
2007 Overall Acoustics (with CIF)	% numbers	0%	1%	13%	16%	17%	33%	17%	2%	1%	0%	0%	100%
2008 Overall Acoustics (with CIF)	% numbers	0%	0%	35%	14%	8%	12%	18%	9%	3%	0%	0%	100%
2009 Acoustics Overall (with CIF)	% numbers	0%	2%	23%	52%	7%	4%	4%	5%	2%	1%	0%	100%
2010 All Acoustics (with CIF)	% numbers	0%	0%	17%	24%	43%	5%	2%	3%	3%	1%	0%	100%
2011 Acoustics Overall (with CIF)	% numbers	0%	4%	26%	31%	20%	16%	2%	1%	0%	1%	0%	100%
2012 Acoustics Overall (with CIF)	% numbers	0%	0%	7%	29%	33%	17%	10%	1%	1%	1%	0%	100%
2013 Acoustics Overall (with CIF)	% numbers	0%	6%	20%	15%	23%	20%	9%	4%	1%	0%	0%	100%
2014 Acoustics Overall (with CIF)	% numbers	0%	0%	28%	20%	11%	18%	14%	6%	2%	0%	0%	100%
1999 Acoustics Overall (with CIF)	Catch wt. (t)	-	96	24,192	77,967	189,673	166,157	62,435	17,088	4,610	1,697	1,414	545,330
2000 Acoustics Overall (with CIF)	Catch wt. (t)	-	1,967	15,228	130,629	159,199	99,112	69,368	36,577	5,245	2,903	546	520,774
2001 Sub-total Stock Acoustic (with CIF)	Catch wt. (t)	-	8,962	226,129	78,412	117,923	77,160	47,004	11,357	8,874	925	8	576,753
2002 Acoustics Stock Overall (with CIF)	Catch wt. (t)	74	7,519	83,622	246,962	118,066	41,279	23,066	15,020	10,427	4,707	4,840	555,582
2003 Overall Acoustics (with CIF)	Catch wt. (t)	-	6,356	141,540	104,192	167,881	36,889	20,239	6,916	5,823	3,767	3,323	496,924
2004 Acoustics Overall (with CIF)	Catch wt. (t)	-	1,841	108,188	222,883	81,843	60,077	18,071	6,627	12,335	2,117	5,038	519,019
2005 Acoustics Overall (with CIF)	Catch wt. (t)	-	280	30,686	143,951	60,907	24,217	24,136	11,077	3,128	590	2,152	301,125
2006 Acoustics Overall (with CIF)	Catch wt. (t)	-	416	27,544	71,463	127,551	64,562	39,216	10,082	1,145	772	340	343,092
2007 Overall Acoustics (with CIF)	Catch wt. (t)	-	3,040	46,123	72,547	97,393	206,507	106,409	14,277	6,624	1,471	1,090	555,480
2008 Overall Acoustics (with CIF)	Catch wt. (t)	-	16	63,007	31,776	23,445	36,090	64,098	31,902	12,279	2,034	261	264,908
2009 Acoustics Overall (with CIF)	Catch wt. (t)	-	5,283	81,430	240,978	39,943	26,608	31,759	36,917	18,285	4,791	998	486,992
2010 All Acoustics (with CIF)	Catch wt. (t)	-	349	35,859	65,554	138,675	20,324	10,438	17,461	14,494	6,258	2,646	312,057
2011 Acoustics Overall (with CIF)	Catch wt. (t)	0	8,260	82,324	136,092	101,658	93,000	10,640	5,602	4,421	5,103	1,670	448,770
2012 Acoustics Overall (with CIF)	Catch wt. (t)	2	203	23,020	120,016	158,702	93,348	56,656	10,103	6,070	4,526	3,379	476,026
2013 Acoustics Overall (with CIF)	Catch wt. (t)	0	12,011	49,864	47,325	80,586	82,660	42,377	20,896	3,460	991	1,525	341,695
2014 Acoustics Overall (with CIF)	Catch wt. (t)	-	705	93,800	81,948	51,581	97,380	83,326	36,375	13,617	3,206	510	462,447

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total SSB
1999 Acoustics Overall (with CIF)	Numbers (x1,000)	-	972	183,418	489,829	1,062,907	786,929	263,817	62,824	15,293	5,294	3,652	2,874,933
2000 Acoustics Overall (with CIF)	Numbers (x1,000)	-	20,042	134,995	899,046	883,867	480,402	316,374	153,234	18,167	9,466	1,370	2,916,964
2001 Sub-total Stock Acoustic (with CIF)	Numbers (x1,000)	-	138,378	1,863,364	520,051	629,493	344,389	185,290	40,507	33,537	2,907	25	3,757,943
2002 Acoustics Stock Overall (with CIF)	Numbers (x1,000)	2,847	132,918	666,501	1,632,217	675,677	191,965	93,831	58,234	43,805	17,392	17,274	3,532,661
2003 Overall Acoustics (with CIF)	Numbers (x1,000)	-	75,899	1,280,141	716,456	968,658	192,680	91,717	27,831	23,605	14,876	13,196	3,405,060
2004 Acoustics Overall (with CIF)	Numbers (x1,000)	-	29,138	977,495	1,564,177	429,090	301,861	86,440	27,005	54,019	7,473	19,841	3,496,538
2005 Acoustics Overall (with CIF)	Numbers (x1,000)	-	5,743	270,611	989,364	375,723	128,849	112,316	50,960	12,657	2,161	8,707	1,957,092
2006 Acoustics Overall (with CIF)	Numbers (x1,000)	-	5,925	237,497	459,245	738,445	339,588	186,063	44,547	4,543	2,894	1,191	2,019,938
2007 Overall Acoustics (with CIF)	Numbers (x1,000)	-	30,745	378,840	471,617	523,359	1,008,862	506,663	54,973	25,067	5,177	3,699	3,009,003
2008 Overall Acoustics (with CIF)	Numbers (x1,000)	-	200	530,159	208,001	124,260	172,143	273,854	130,451	47,003	7,018	862	1,493,951
2009 Acoustics Overall (with CIF)	Numbers (x1,000)	-	80,153	748,194	1,675,788	228,794	128,524	135,293	147,571	69,756	17,166	3,339	3,234,577
2010 All Acoustics (with CIF)	Numbers (x1,000)	-	5,321	364,994	521,396	911,479	112,611	48,457	73,892	59,104	24,968	10,290	2,132,512
2011 Acoustics Overall (with CIF)	Numbers (x1,000)	0	144,094	886,891	1,083,801	675,731	543,019	54,854	24,559	17,249	19,710	6,191	3,456,098
2012 Acoustics Overall (with CIF)	Numbers (x1,000)	130	3,028	227,273	961,371	1,088,022	565,948	311,235	47,020	24,713	17,761	12,766	3,259,266
2013 Acoustics Overall (with CIF)	Numbers (x1,000)	18	154,304	514,279	382,897	577,748	513,497	235,337	107,002	15,930	3,557	5,426	2,509,994
2014 Acoustics Overall (with CIF)	Numbers (x1,000)	-	8,860	797,713	570,309	315,593	524,273	413,167	162,800	58,365	12,134	1,790	2,865,003

Table 23B. Acoustic age composition for the German Bank component from 1999 to 2014 (with % by weight, % by number, catch/survey biomass (t) and numbers (thousands) by age). A dash (-) indicates no data.

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 German Bank Acoustic Overall (with CIF)	% catch wt.	0%	0%	4%	14%	34%	30%	11%	3%	1%	0%	0%	100%
2000 German Bank Overall (with CIF)	% catch wt.	0%	1%	3%	26%	30%	17%	15%	7%	1%	1%	0%	100%
2001 German Bank Acoustic (with CIF)	% catch wt.	0%	3%	41%	12%	19%	13%	8%	2%	2%	0%	0%	100%
2002 German Bank Overall (with CIF)	% catch wt.	0%	1%	16%	42%	21%	7%	4%	3%	2%	1%	1%	99%
2003 German Bank Acoustics (with CIF)	% catch wt.	0%	1%	32%	20%	30%	8%	4%	1%	1%	1%	1%	99%
2004 Acoustics German Bank (with CIF)	% catch wt.	0%	0%	19%	46%	16%	10%	3%	1%	3%	0%	1%	99%
2005 German Bank Acoustics (with CIF)	% catch wt.	0%	0%	10%	47%	20%	8%	8%	4%	1%	0%	1%	99%
2006 German Bank Acoustics (with CIF)	% catch wt.	0%	0%	8%	20%	37%	19%	12%	3%	0%	0%	0%	100%
2007 German Bank Acoustics (with CIF)	% catch wt.	0%	1%	8%	12%	17%	38%	20%	2%	1%	0%	0%	100%
2008 German Bank Acoustics (with CIF)	% catch wt.	0%	0%	24%	12%	9%	13%	24%	12%	5%	1%	0%	100%
2009 German Bank Acoustics (with CIF)	% catch wt.	0%	1%	16%	49%	8%	5%	7%	8%	4%	1%	0%	100%
2010 German Bank Acoustics Overall (with CIF)	% catch wt.	0%	0%	10%	20%	44%	6%	3%	6%	5%	2%	1%	99%
2011 German Bank Overall (with CIF)	% catch wt.	0%	3%	19%	29%	22%	21%	2%	1%	1%	1%	0%	100%
2012 Acoustics German Bank (with CIF)	% catch wt.	0%	0%	6%	31%	32%	16%	9%	2%	2%	1%	1%	99%
2013 Acoustics German Bank (with CIF)	% catch wt.	0%	4%	17%	14%	24%	22%	11%	6%	1%	0%	0%	100%
2014 Acoustics German Bank (with CIF)	% catch wt.	0%	0%	16%	22%	14%	21%	16%	7%	3%	0%	0%	100%
1999 German Bank Acoustic Overall (with CIF)	% numbers	0%	0%	6%	17%	37%	27%	9%	2%	1%	0%	0%	100%
2000 German Bank Overall (with CIF)	% numbers	0%	1%	5%	31%	29%	15%	12%	5%	1%	0%	0%	100%
2001 German Bank Acoustic (with CIF)	% numbers	0%	8%	50%	12%	15%	9%	5%	1%	1%	0%	0%	100%
2002 German Bank Overall (with CIF)	% numbers	0%	4%	20%	44%	19%	5%	3%	2%	1%	0%	0%	100%
2003 German Bank Acoustics (with CIF)	% numbers	0%	2%	41%	20%	25%	6%	3%	1%	1%	0%	0%	100%
2004 Acoustics German Bank (with CIF)	% numbers	0%	1%	25%	48%	12%	7%	2%	1%	2%	0%	1%	99%
2005 German Bank Acoustics (with CIF)	% numbers	0%	0%	14%	50%	19%	7%	6%	3%	1%	0%	0%	100%
2006 German Bank Acoustics (with CIF)	% numbers	0%	0%	12%	22%	36%	17%	9%	2%	0%	0%	0%	100%
2007 German Bank Acoustics (with CIF)	% numbers	0%	1%	12%	15%	17%	34%	18%	2%	1%	0%	0%	100%
2008 German Bank Acoustics (with CIF)	% numbers	0%	0%	36%	14%	8%	11%	18%	9%	3%	0%	0%	100%
2009 German Bank Acoustics (with CIF)	% numbers	0%	2%	22%	52%	7%	4%	4%	5%	2%	1%	0%	100%
2010 German Bank Acoustics Overall (with CIF)	% numbers	0%	0%	16%	24%	43%	5%	2%	4%	3%	1%	1%	99%
2011 German Bank Overall (with CIF)	% numbers	0%	6%	27%	29%	19%	15%	1%	1%	1%	1%	0%	100%
2012 Acoustics German Bank (with CIF)	% numbers	0%	0%	9%	36%	31%	14%	7%	1%	1%	1%	1%	99%
2013 Acoustics German Bank (with CIF)	% numbers	0%	8%	23%	15%	23%	18%	8%	4%	1%	0%	0%	100%
2014 Acoustics German Bank (with CIF)	% numbers	0%	0%	22%	25%	14%	18%	13%	5%	2%	0%	0%	100%
1999 German Bank Acoustic Overall (with CIF)	Catch wt. (t)	-	94	22,020	71,969	170,866	150,058	56,609	16,095	4,580	1,666	1,403	495,360
2000 German Bank Overall (with CIF)	Catch wt. (t)	-	1,714	11,428	85,499	99,807	57,948	48,812	22,450	3,959	1,781	542	333,940
2001 German Bank Acoustic (with CIF)	Catch wt. (t)	-	8,709	105,329	31,035	47,725	33,793	21,101	4,622	4,485	512	-	257,310
2002 German Bank Overall (with CIF)	Catch wt. (t)	65	6,286	67,234	176,687	90,152	30,366	17,751	11,648	9,474	3,049	3,468	416,181
2003 German Bank Acoustics (with CIF)	Catch wt. (t)	-	4,120	111,880	70,453	105,752	28,232	14,854	4,812	3,817	2,258	2,597	348,776
2004 Acoustics German Bank (with CIF)	Catch wt. (t)	-	1,543	74,501	181,390	64,019	38,787	11,728	5,034	10,206	1,124	3,625	391,955
2005 German Bank Acoustics (with CIF)	Catch wt. (t)	-	253	28,259	127,632	53,781	22,164	21,719	9,605	2,690	537	1,939	268,580
2006 German Bank Acoustics (with CIF)	Catch wt. (t)	-	385	24,848	60,454	109,208	55,536	34,201	8,844	973	649	293	295,390
2007 German Bank Acoustics (with CIF)	Catch wt. (t)	-	2,626	38,067	61,417	85,462	188,827	102,160	12,151	6,359	1,334	957	499,361
2008 German Bank Acoustics (with CIF)	Catch wt. (t)	-	-	58,937	28,340	21,000	30,528	58,958	29,408	11,722	1,797	261	240,950
2009 German Bank Acoustics (with CIF)	Catch wt. (t)	-	3,753	64,068	196,736	32,188	21,514	26,020	31,485	16,399	4,519	978	397,660
2010 German Bank Acoustics Overall (with CIF)	Catch wt. (t)	-	224	26,819	52,092	113,756	15,750	8,461	15,402	13,099	5,679	2,487	253,769
2011 German Bank Overall (with CIF)	Catch wt. (t)	-	7,846	56,905	87,082	67,336	62,429	5,092	4,232	3,545	4,494	1,499	300,460
2012 Acoustics German Bank (with CIF)	Catch wt. (t)	-	134	17,915	88,968	92,271	45,791	27,105	5,077	4,732	3,500	2,951	288,443
2013 Acoustics German Bank (with CIF)	Catch wt. (t)	-	11,688	45,041	37,523	63,130	57,987	28,921	15,801	2,379	855	1,204	264,528
2014 Acoustics German Bank (with CIF)	Catch wt. (t)	-	489	36,873	52,144	31,877	47,689	37,741	17,089	6,181	1,095	373	231,552

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 German Bank Acoustic Overall (with CIF)	Numbers (x1,000)	-	948	166,864	451,905	959,130	709,941	237,407	58,820	15,194	5,192	3,624	2,609,024
2000 German Bank Overall (with CIF)	Numbers (x1,000)	-	17,625	102,000	589,063	553,882	289,467	226,575	96,514	13,709	5,760	1,361	1,895,957
2001 German Bank Acoustic (with CIF)	Numbers (x1,000)	-	135,703	894,080	210,906	258,067	152,649	84,043	16,527	17,480	1,604	-	1,771,058
2002 German Bank Overall (with CIF)	Numbers (x1,000)	2,537	111,379	539,725	1,166,924	519,058	142,215	72,525	45,273	39,941	11,155	12,261	2,662,994
2003 German Bank Acoustics (with CIF)	Numbers (x1,000)	-	46,007	1,004,407	494,420	612,116	148,687	67,475	19,473	15,492	8,908	10,457	2,427,440
2004 Acoustics German Bank (with CIF)	Numbers (x1,000)	-	24,531	677,770	1,277,135	332,022	196,099	56,805	20,672	45,133	3,596	14,378	2,648,140
2005 German Bank Acoustics (with CIF)	Numbers (x1,000)	-	5,182	248,168	870,294	330,085	118,133	100,841	44,127	10,910	1,977	7,905	1,737,625
2006 German Bank Acoustics (with CIF)	Numbers (x1,000)	-	5,494	214,151	386,345	629,197	290,199	161,640	39,049	3,876	2,456	1,029	1,733,437
2007 German Bank Acoustics (with CIF)	Numbers (x1,000)	-	26,261	310,742	397,519	458,661	920,624	486,502	46,109	24,135	4,666	3,250	2,678,468
2008 German Bank Acoustics (with CIF)	Numbers (x1,000)	-	-	496,210	185,856	110,437	146,499	252,158	120,986	44,750	6,190	862	1,363,949
2009 German Bank Acoustics (with CIF)	Numbers (x1,000)	-	54,955	583,192	1,360,737	182,941	103,267	109,573	124,811	62,074	16,154	3,273	2,600,976
2010 German Bank Acoustics Overall (with CIF)	Numbers (x1,000)	-	3,316	272,314	414,147	744,621	86,016	39,053	64,928	53,120	22,533	9,635	1,709,683
2011 German Bank Overall (with CIF)	Numbers (x1,000)	-	136,458	624,134	684,168	434,182	360,193	24,543	18,531	13,595	17,288	5,549	2,318,639
2012 Acoustics German Bank (with CIF)	Numbers (x1,000)	-	1,946	174,959	711,646	623,273	271,374	142,452	22,099	18,998	13,364	11,056	1,991,166
2013 Acoustics German Bank (with CIF)	Numbers (x1,000)	-	150,296	466,144	302,837	455,609	358,555	161,390	81,112	10,799	3,040	4,257	1,994,037
2014 Acoustics German Bank (with CIF)	Numbers (x1,000)	-	5,678	305,885	350,889	189,632	247,476	183,560	73,417	25,776	4,374	1,334	1,388,020

Table 23C. Acoustic age composition for the Scots Bay component from 1999 to 2014 (with % by weight, % by number, catch/survey biomass (t) and numbers (thousands) by age). A dash (-) indicates no data.

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 Scots Bay Acoustic Overall (with CIF)	% catch wt.	0%	0%	4%	14%	34%	30%	11%	3%	1%	0%	0%	100%
2000 Scots Bay Overall (with CIF)	% catch wt.	0%	1%	3%	26%	30%	17%	15%	7%	1%	1%	0%	100%
2001 Scots Bay Acoustic (with CIF)	% catch wt.	0%	3%	41%	12%	19%	13%	8%	2%	2%	0%	0%	100%
2002 Scots Bay Overall (with CIF)	% catch wt.	0%	1%	16%	42%	21%	7%	4%	3%	2%	1%	1%	99%
2003 Scots Bay Acoustics (with CIF)	% catch wt.	0%	1%	32%	20%	30%	8%	4%	1%	1%	1%	1%	99%
2004 Acoustics Scots Bay (with CIF)	% catch wt.	0%	0%	19%	46%	16%	10%	3%	1%	3%	0%	1%	99%
2005 Scots Bay Acoustics (with CIF)	% catch wt.	0%	0%	10%	47%	20%	8%	8%	4%	1%	0%	1%	99%
2006 Scots Bay Acoustics (with CIF)	% catch wt.	0%	0%	8%	20%	37%	19%	12%	3%	0%	0%	0%	100%
2007 Scots Bay Acoustics (with CIF)	% catch wt.	0%	1%	8%	12%	17%	38%	20%	2%	1%	0%	0%	100%
2008 Scots Bay Acoustics (with CIF)	% catch wt.	0%	0%	24%	12%	9%	13%	24%	12%	5%	1%	0%	100%
2009 Scots Bay Acoustics (with CIF)	% catch wt.	0%	1%	16%	49%	8%	5%	7%	8%	4%	1%	0%	100%
2010 Scots Bay Acoustics Overall (with CIF)	% catch wt.	0%	0%	10%	20%	44%	6%	3%	6%	5%	2%	1%	99%
2011 Scots Bay Overall (with CIF)	% catch wt.	0%	3%	19%	29%	22%	21%	2%	1%	1%	1%	0%	100%
2012 Acoustics Scots Bay (with CIF)	% catch wt.	0%	0%	6%	31%	32%	16%	9%	2%	2%	1%	1%	99%
2013 Acoustics Scots Bay (with CIF)	% catch wt.	0%	4%	17%	14%	24%	22%	11%	6%	1%	0%	0%	100%
2014 Acoustics Scots Bay (with CIF)	% catch wt.	0%	0%	16%	22%	14%	21%	16%	7%	3%	0%	0%	100%
1999 Scots Bay Acoustic Overall (with CIF)	% numbers	0%	0%	6%	17%	37%	27%	9%	2%	1%	0%	0%	100%
2000 Scots Bay Overall (with CIF)	% numbers	0%	1%	5%	31%	29%	15%	12%	5%	1%	0%	0%	100%
2001 Scots Bay Acoustic (with CIF)	% numbers	0%	8%	50%	12%	15%	9%	5%	1%	1%	0%	0%	100%
2002 Scots Bay Overall (with CIF)	% numbers	0%	4%	20%	44%	19%	5%	3%	2%	1%	0%	0%	100%
2003 Scots Bay Acoustics (with CIF)	% numbers	0%	2%	41%	20%	25%	6%	3%	1%	1%	0%	0%	100%
2004 Acoustics Scots Bay (with CIF)	% numbers	0%	1%	25%	48%	12%	7%	2%	1%	2%	0%	1%	99%
2005 Scots Bay Acoustics (with CIF)	% numbers	0%	0%	14%	50%	19%	7%	6%	3%	1%	0%	0%	100%
2006 Scots Bay Acoustics (with CIF)	% numbers	0%	0%	12%	22%	36%	17%	9%	2%	0%	0%	0%	100%
2007 Scots Bay Acoustics (with CIF)	% numbers	0%	1%	12%	15%	17%	34%	18%	2%	1%	0%	0%	100%
2008 Scots Bay Acoustics (with CIF)	% numbers	0%	0%	36%	14%	8%	11%	18%	9%	3%	0%	0%	100%
2009 Scots Bay Acoustics (with CIF)	% numbers	0%	2%	22%	52%	7%	4%	4%	5%	2%	1%	0%	100%
2010 Scots Bay Acoustics Overall (with CIF)	% numbers	0%	0%	16%	24%	43%	5%	2%	4%	3%	1%	1%	99%
2011 Scots Bay Overall (with CIF)	% numbers	0%	6%	27%	29%	19%	15%	1%	1%	1%	1%	0%	100%
2012 Acoustics Scots Bay (with CIF)	% numbers	0%	0%	9%	36%	31%	14%	7%	1%	1%	1%	1%	99%
2013 Acoustics Scots Bay (with CIF)	% numbers	0%	8%	23%	15%	23%	18%	8%	4%	1%	0%	0%	100%
2014 Acoustics Scots Bay (with CIF)	% numbers	0%	0%	22%	25%	14%	18%	13%	5%	2%	0%	0%	100%
1999 Scots Bay Acoustic Overall (with CIF)	Catch wt. (t)	-	94	22,020	71,969	170,866	150,058	56,609	16,095	4,580	1,666	1,403	495,360
2000 Scots Bay Overall (with CIF)	Catch wt. (t)	-	1,714	11,428	85,499	99,807	57,948	48,812	22,450	3,959	1,781	542	333,940
2001 Scots Bay Acoustic (with CIF)	Catch wt. (t)	-	8,709	105,329	31,035	47,725	33,793	21,101	4,622	4,485	512	-	257,310
2002 Scots Bay Overall (with CIF)	Catch wt. (t)	65	6,286	67,234	176,687	90,152	30,366	17,751	11,648	9,474	3,049	3,468	416,181
2003 Scots Bay Acoustics (with CIF)	Catch wt. (t)	-	4,120	111,880	70,453	105,752	28,232	14,854	4,812	3,817	2,258	2,597	348,776
2004 Acoustics Scots Bay (with CIF)	Catch wt. (t)	-	1,543	74,501	181,390	64,019	38,787	11,728	5,034	10,206	1,124	3,625	391,955
2005 Scots Bay Acoustics (with CIF)	Catch wt. (t)	-	253	28,259	127,632	53,781	22,164	21,719	9,605	2,690	537	1,939	268,580
2006 Scots Bay Acoustics (with CIF)	Catch wt. (t)	-	385	24,848	60,454	109,208	55,536	34,201	8,844	973	649	293	295,390
2007 Scots Bay Acoustics (with CIF)	Catch wt. (t)	-	2,626	38,067	61,417	85,462	188,827	102,160	12,151	6,359	1,334	957	499,361
2008 Scots Bay Acoustics (with CIF)	Catch wt. (t)	-	-	58,937	28,340	21,000	30,528	58,958	29,408	11,722	1,797	261	240,950
2009 Scots Bay Acoustics (with CIF)	Catch wt. (t)	-	3,753	64,068	196,736	32,188	21,514	26,020	31,485	16,399	4,519	978	397,660
2010 Scots Bay Acoustics Overall (with CIF)	Catch wt. (t)	-	224	26,819	52,092	113,756	15,750	8,461	15,402	13,099	5,679	2,487	253,769
2011 Scots Bay Overall (with CIF)	Catch wt. (t)	-	7,846	56,905	87,082	67,336	62,429	5,092	4,232	3,545	4,494	1,499	300,460
2012 Acoustics Scots Bay (with CIF)	Catch wt. (t)	-	134	17,915	88,968	92,271	45,791	27,105	5,077	4,732	3,500	2,951	288,443
2013 Acoustics Scots Bay (with CIF)	Catch wt. (t)	-	11,688	45,041	37,523	63,130	57,987	28,921	15,801	2,379	855	1,204	264,528
2014 Acoustics Scots Bay (with CIF)	Catch wt. (t)	-	489	36,873	52,144	31,877	47,689	37,741	17,089	6,181	1,095	373	231,552

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 Scots Bay Acoustic Overall (with CIF)	Numbers (x1,000)	-	948	166,864	451,905	959,130	709,941	237,407	58,820	15,194	5,192	3,624	2,609,024
2000 Scots Bay Overall (with CIF)	Numbers (x1,000)	-	17,625	102,000	589,063	553,882	289,467	226,575	96,514	13,709	5,760	1,361	1,895,957
2001 Scots Bay Acoustic (with CIF)	Numbers (x1,000)	-	135,703	894,080	210,906	258,067	152,649	84,043	16,527	17,480	1,604	-	1,771,058
2002 Scots Bay Overall (with CIF)	Numbers (x1,000)	2,537	111,379	539,725	1,166,924	519,058	142,215	72,525	45,273	39,941	11,155	12,261	2,662,994
2003 Scots Bay Acoustics (with CIF)	Numbers (x1,000)	-	46,007	1,004,407	494,420	612,116	148,687	67,475	19,473	15,492	8,908	10,457	2,427,440
2004 Acoustics Scots Bay (with CIF)	Numbers (x1,000)	-	24,531	677,770	1,277,135	332,022	196,099	56,805	20,672	45,133	3,596	14,378	2,648,140
2005 Scots Bay Acoustics (with CIF)	Numbers (x1,000)	-	5,182	248,168	870,294	330,085	118,133	100,841	44,127	10,910	1,977	7,905	1,737,625
2006 Scots Bay Acoustics (with CIF)	Numbers (x1,000)	-	5,494	214,151	386,345	629,197	290,199	161,640	39,049	3,876	2,456	1,029	1,733,437
2007 Scots Bay Acoustics (with CIF)	Numbers (x1,000)	-	26,261	310,742	397,519	458,661	920,624	486,502	46,109	24,135	4,666	3,250	2,678,468
2008 Scots Bay Acoustics (with CIF)	Numbers (x1,000)	-	-	496,210	185,856	110,437	146,499	252,158	120,986	44,750	6,190	862	1,363,949
2009 Scots Bay Acoustics (with CIF)	Numbers (x1,000)	-	54,955	583,192	1,360,737	182,941	103,267	109,573	124,811	62,074	16,154	3,273	2,600,976
2010 Scots Bay Acoustics Overall (with CIF)	Numbers (x1,000)	-	3,316	272,314	414,147	744,621	86,016	39,053	64,928	53,120	22,533	9,635	1,709,683
2011 Scots Bay Overall (with CIF)	Numbers (x1,000)	-	136,458	624,134	684,168	434,182	360,193	24,543	18,531	13,595	17,288	5,549	2,318,639
2012 Acoustics Scots Bay (with CIF)	Numbers (x1,000)	-	1,946	174,959	711,646	623,273	271,374	142,452	22,099	18,998	13,364	11,056	1,991,166
2013 Acoustics Scots Bay (with CIF)	Numbers (x1,000)	-	150,296	466,144	302,837	455,609	358,555	161,390	81,112	10,799	3,040	4,257	1,994,037
2014 Acoustics Scots Bay (with CIF)	Numbers (x1,000)	-	5,678	305,885	350,889	189,632	247,476	183,560	73,417	25,776	4,374	1,334	1,388,020

Table 24A. Biological characteristics from sampling for the overall SWNS/BoF component acoustic surveys from 1999 to 2014 with average length (cm) and average weight (g) by age. A dash (-) indicates no data.

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 Acoustics Overall (with CIF)	Avg. len (cm)	-	23.2	25.3	26.9	27.9	29.4	30.4	31.9	33.0	33.5	-	28.3
2000 Acoustics Overall (with CIF)	Avg. len (cm)	-	23.9	24.9	26.8	28.6	29.8	30.5	31.2	33.2	33.5	-	28.4
2001 Overall Stock Acoustic (with CIF)	Avg. len (cm)	-	20.9	25.2	26.8	28.5	30.1	31.3	32.2	31.7	33.5	-	26.7
2002 Acoustics Stock Overall (with CIF)	Avg. len (cm)	15.9	20.2	25.7	27.2	28.3	30.1	31.3	31.8	31.3	31.9	-	27.3
2003 Overall Acoustics (with CIF)	Avg. len (cm)	-	22.5	24.6	26.7	28.2	29.1	30.3	31.4	31.4	31.6	-	26.6
2004 Acoustics Overall (with CIF)	Avg. len (cm)	-	20.8	24.6	26.6	29.0	29.3	29.7	31.2	30.6	32.5	-	26.7
2005 Acoustics Overall (with CIF)	Avg. len (cm)	-	19.2	24.7	26.7	27.6	28.9	30.1	30.2	31.4	32.4	-	27.1
2006 Acoustics Overall (with CIF)	Avg. len (cm)	-	21.2	24.7	26.9	27.8	28.6	29.5	30.1	31.1	31.7	-	27.6
2007 Overall Acoustics (with CIF)	Avg. len (cm)	-	23.7	25.1	26.9	28.4	29.2	29.4	31.3	31.5	32.1	-	28.3
2008 Overall Acoustics (with CIF)	Avg. len (cm)	-	22.0	24.8	26.7	28.4	29.3	30.3	30.7	31.3	32.3	-	27.6
2009 Acoustics Overall (with CIF)	Avg. len (cm)	-	20.9	24.2	26.3	27.8	29.2	30.3	30.9	31.3	32.0	32.7	26.4
2010 All Acoustics (with CIF)	Avg. len (cm)	-	21.4	24.0	25.8	27.2	28.6	30.2	31.0	31.3	31.6	31.9	26.8
2011 Acoustics Overall (with CIF)	Avg. len (cm)	12.5	19.9	23.0	25.3	26.8	27.9	28.9	30.6	31.7	31.9	32.3	25.4
2012 Acoustics Overall (with CIF)	Avg. len (cm)	13.7	21.1	23.9	25.4	26.7	27.7	28.6	30.1	31.4	31.7	32.1	26.6
2013 Acoustics Overall (with CIF)	Avg. len (cm)	11.5	22.5	24.0	25.7	26.6	27.7	28.6	29.4	30.3	32.7	32.7	26.3
2014 Acoustics Overall (with CIF)	Avg. len (cm)	-	21.8	24.6	26.0	27.0	28.1	28.8	29.8	30.2	31.4	31.9	26.8
1999 Acoustics Overall (with CIF)	Avg. wt. (g)	2	98	132	159	178	211	237	272	301	321	-	190
2000 Acoustics Overall (with CIF)	Avg. wt. (g)	2	98	113	145	180	206	219	239	289	307	-	179
2001 Overall Stock Acoustic (with CIF)	Avg. wt. (g)	2	65	121	151	187	224	254	280	265	318	-	153
2002 Acoustics Stock Overall (with CIF)	Avg. wt. (g)	2	57	125	151	175	215	246	258	238	271	-	157
2003 Overall Acoustics (with CIF)	Avg. wt. (g)	2	84	111	145	173	191	221	248	247	253	-	146
2004 Acoustics Overall (with CIF)	Avg. wt. (g)	2	63	111	142	191	199	209	245	228	283	-	148
2005 Acoustics Overall (with CIF)	Avg. wt. (g)	2	49	113	145	162	188	215	217	247	273	-	154
2006 Acoustics Overall (with CIF)	Avg. wt. (g)	2	70	116	156	173	190	211	226	252	267	-	170
2007 Overall Acoustics (with CIF)	Avg. wt. (g)	2	99	122	154	186	205	210	260	264	284	-	185
2008 Overall Acoustics (with CIF)	Avg. wt. (g)	2	80	119	153	189	210	234	245	261	290	-	177
2009 Acoustics Overall (with CIF)	Avg. wt. (g)	2	66	109	144	175	207	235	250	262	279	299	151
2010 All Acoustics (with CIF)	Avg. wt. (g)	2	66	98	126	152	180	215	236	245	251	257	146
2011 Acoustics Overall (with CIF)	Avg. wt. (g)	2	57	93	126	150	171	194	228	256	259	270	130
2012 Acoustics Overall (with CIF)	Avg. wt. (g)	2	67	101	125	146	165	182	215	246	255	265	146
2013 Acoustics Overall (with CIF)	Avg. wt. (g)	2	78	97	124	139	161	180	195	217	279	281	136
2014 Acoustics Overall (with CIF)	Avg. wt. (g)	2	80	118	144	163	186	202	223	233	264	285	161

Table 24B. Biological characteristics from sampling for German Bank acoustic surveys from 1999 to 2014 with average length (cm) and average weight (g) by age. A dash (-) indicates no data.

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 German Bank Acoustic (with CIF)	Avg. len (cm)	-	23.2	25.4	26.9	27.9	29.4	30.5	31.9	33.0	33.5	-	28.3
2000 German Bank Overall (with CIF)	Avg. len (cm)	-	23.9	24.9	26.9	28.7	29.7	30.5	31.1	33.2	33.6	-	28.4
2001 German Bank Acoustic (with CIF)	Avg. len (cm)	-	20.9	25.1	26.7	28.6	30.2	31.4	32.4	31.5	33.7	-	26.3
2002 German Bank Overall (with CIF)	Avg. len (cm)	15.9	20.2	25.7	27.3	28.3	30.1	31.3	31.8	31.3	32.0	-	27.3
2003 German Bank Acoustics (with CIF)	Avg. len (cm)	-	23.1	24.7	26.5	28.2	29.0	30.3	31.4	31.4	31.6	-	26.5
2004 Acoustics German Bank (with CIF)	Avg. len (cm)	-	20.8	24.6	26.6	29.1	29.3	29.7	31.2	30.6	33.6	-	26.7
2005 German Bank Acoustics (with CIF)	Avg. len (cm)	-	19.2	24.8	26.8	27.6	28.9	30.1	30.2	31.4	32.3	-	27.1
2006 German Bank Acoustics (with CIF)	Avg. len (cm)	-	21.1	24.7	27.0	27.8	28.6	29.5	30.1	31.1	31.6	-	27.6
2007 German Bank Acoustics (with CIF)	Avg. len (cm)	-	23.8	25.2	27.0	28.5	29.3	29.4	31.4	31.5	32.2	-	28.4
2008 German Bank Acoustics (with CIF)	Avg. len (cm)	-	-	24.8	26.7	28.5	29.3	30.3	30.6	31.4	32.3	-	27.6
2009 German Bank Acoustics (with CIF)	Avg. len (cm)	-	21.2	24.3	26.3	27.9	29.2	30.4	31.0	31.4	32.0	32.7	26.5
2010 German Bank Acoustics (with CIF)	Avg. len (cm)	-	21.6	24.0	25.8	27.3	28.7	30.2	31.0	31.4	31.6	31.9	26.9
2011 German Bank Overall (with CIF)	Avg. len (cm)	-	19.9	22.9	25.5	27.2	28.1	29.7	30.7	32.0	32.0	32.4	25.4
2012 Acoustics German Bank (with CIF)	Avg. len (cm)	-	21.3	23.9	25.4	26.8	27.9	28.9	30.6	31.5	32.0	32.2	26.5
2013 Acoustics German Bank (with CIF)	Avg. len (cm)	-	22.5	24.0	25.8	26.6	27.8	28.7	29.4	30.4	32.8	32.8	26.1
2014 Acoustics German Bank (with CIF)	Avg. len (cm)	-	22.4	24.7	26.2	27.1	28.2	28.8	29.8	30.1	30.5	31.6	27.0
1999 German Bank Acoustic (with CIF)	Avg. wt. (g)	2.0	98.9	132.0	159.3	178.1	211.4	238.4	273.6	301.4	320.8	-	189.9
2000 German Bank Overall (with CIF)	Avg. wt. (g)	2.0	97.3	112.0	145.1	180.2	200.2	215.4	232.6	288.8	309.2	-	176.1
2001 German Bank Acoustic (with CIF)	Avg. wt. (g)	2.0	64.2	117.8	147.2	184.9	221.4	251.1	279.6	256.6	319.3	-	145.3
2002 German Bank Overall (with CIF)	Avg. wt. (g)	2.0	56.4	124.6	151.4	173.7	213.5	244.8	257.3	237.2	273.3	-	156.3
2003 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	89.6	111.4	142.5	172.8	189.9	220.1	247.1	246.4	253.5	-	143.7
2004 Acoustics German Bank (with CIF)	Avg. wt. (g)	2.0	62.9	109.9	142.0	192.8	197.8	206.5	243.5	226.1	312.5	-	148.0
2005 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	48.8	113.9	146.7	162.9	187.6	215.4	217.7	246.6	271.9	-	154.6
2006 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	70.0	116.0	156.5	173.6	191.4	211.6	226.5	251.1	264.2	-	170.4
2007 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	100.0	122.5	154.5	186.3	205.1	210.0	263.5	263.5	285.9	-	186.4
2008 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	-	118.8	152.5	190.1	208.4	233.8	243.1	261.9	290.4	-	176.7
2009 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	68.3	109.9	144.6	175.9	208.3	237.5	252.3	264.2	279.8	298.7	152.9
2010 German Bank Acoustics (with CIF)	Avg. wt. (g)	2.0	67.5	98.5	125.8	152.8	183.1	216.7	237.2	246.6	252.0	258.1	148.4
2011 German Bank Overall (with CIF)	Avg. wt. (g)	2.0	57.5	91.2	127.3	155.1	173.3	207.5	228.4	260.7	260.0	270.1	129.6
2012 Acoustics German Bank (with CIF)	Avg. wt. (g)	2.0	69.0	102.4	125.0	148.0	168.7	190.3	229.7	249.1	261.9	266.9	144.9
2013 Acoustics German Bank (with CIF)	Avg. wt. (g)	2.0	77.8	96.6	123.9	138.6	161.7	179.2	194.8	220.3	281.2	282.9	132.7
2014 Acoustics German Bank (with CIF)	Avg. wt. (g)	2.0	86.0	120.5	148.6	168.1	192.7	205.6	232.8	239.8	250.4	279.9	166.8

Table 24C. Biological characteristics from sampling for Scots Bay acoustic surveys from 1999 to 2014 with average length (cm) and average weight (g) by age. A dash (-) indicates no data.

Year and Area	Type Data	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
1999 Scots Bay Acoustic (with CIF)	Avg. len (cm)	-	21.5	25.1	26.6	27.9	29.1	29.6	30.7	-	32.5	-	28.1
2000 Scots Bay Overall (with CIF)	Avg. len (cm)	-	24.0	24.8	26.6	28.4	30.0	30.6	31.4	32.9	33.4	-	28.4
2001 Scots Bay Acoustic (with CIF)	Avg. len (cm)	-	22.0	25.2	26.8	28.5	30.1	31.2	32.0	32.4	33.4	-	27.0
2002 Scots Bay Overall (with CIF)	Avg. len (cm)	-	22.5	25.9	27.0	28.3	30.1	31.3	31.6	31.3	31.7	-	27.5
2003 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	22.8	24.4	27.0	28.2	29.2	30.2	31.4	31.2	31.5	-	27.0
2004 Acoustics Scots Bay (with CIF)	Avg. len (cm)	-	20.8	24.7	26.5	28.3	29.2	29.6	31.0	30.4	31.1	-	26.6
2005 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	21.0	24.3	25.9	27.0	28.9	29.6	29.9	31.4	32.5	-	26.6
2006 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	21.6	24.3	26.5	27.5	28.1	29.1	30.0	31.5	32.7	-	27.3
2007 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	22.8	24.7	26.5	28.2	28.9	29.4	30.5	32.2	31.5	-	27.4
2008 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	22.0	24.7	26.6	27.7	29.4	30.2	31.2	30.6	32.0	-	27.8
2009 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	20.1	23.9	26.1	27.6	29.1	30.0	30.6	30.9	31.7	33.0	25.9
2010 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	21.0	23.8	25.6	27.0	28.1	30.0	30.7	30.8	31.0	31.1	26.1
2011 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	19.5	23.3	25.0	26.2	27.5	28.2	30.2	30.8	31.3	31.9	25.4
2012 Scots Bay Acoustics (with CIF)	Avg. len (cm)	13.7	20.6	23.6	25.4	26.6	27.6	28.3	29.6	31.0	31.0	31.7	26.8
2013 Scots Bay Acoustics (with CIF)	Avg. len (cm)	11.5	22.5	24.0	25.4	26.6	27.5	28.6	29.3	29.9	32.1	32.4	26.9
2014 Scots Bay Acoustics (with CIF)	Avg. len (cm)	-	20.8	24.5	25.7	26.8	28.0	28.9	29.7	30.2	31.9	32.7	26.7
1999 Scots Bay Acoustic (with CIF)	Avg. wt. (g)	2.0	78.5	131.0	158.0	181.5	209.0	219.0	244.7	-	293.7	-	187.7
2000 Scots Bay Overall (with CIF)	Avg. wt. (g)	2.0	104.7	115.2	145.6	180.0	215.7	229.1	249.2	288.3	302.8	-	183.1
2001 Scots Bay Acoustic (with CIF)	Avg. wt. (g)	2.0	80.9	125.2	155.0	189.8	227.3	256.8	279.7	291.1	322.0	-	162.7
2002 Scots Bay Overall (with CIF)	Avg. wt. (g)	2.0	79.8	130.2	151.1	178.6	219.8	250.0	260.6	250.8	264.8	-	162.9
2003 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	87.2	108.1	153.0	174.1	196.3	220.4	249.8	245.6	251.6	-	154.2
2004 Acoustics Scots Bay (with CIF)	Avg. wt. (g)	2.0	63.2	113.6	143.8	180.5	199.7	210.4	245.4	230.1	248.4	-	147.9
2005 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	65.5	107.3	134.2	153.9	190.9	207.0	212.9	253.6	285.7	-	147.3
2006 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	73.3	108.4	145.4	164.1	176.5	196.4	217.7	255.2	287.0	-	160.3
2007 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	90.0	118.1	150.2	184.7	200.5	212.0	239.9	285.8	268.2	-	170.2
2008 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	79.9	119.8	155.1	176.8	216.9	237.0	263.8	247.1	285.8	-	184.0
2009 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	60.7	105.1	140.3	168.9	201.5	222.8	238.0	244.5	266.4	310.7	140.5
2010 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	62.3	97.4	125.4	148.7	171.7	210.6	229.1	231.4	236.1	238.5	136.3
2011 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	54.2	97.1	122.5	141.3	166.2	181.0	226.5	239.3	252.2	268.8	129.7
2012 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	63.4	97.3	124.2	142.9	161.4	175.0	201.5	233.9	232.7	249.8	148.0
2013 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	80.5	100.2	122.4	142.8	159.1	181.9	196.8	210.9	264.1	274.4	149.3
2014 Scots Bay Acoustics (with CIF)	Avg. wt. (g)	2.0	67.9	115.6	135.3	156.0	179.2	198.3	215.3	227.9	272.0	301.9	156.1

Table 25. Observations and conclusions on conservation objective elements from the management plan for SWNS/BoF spawning component in 2013 and 2014.

Objective	**2013 and 2014: Observations**
Persistence of all spawning components	Spawning was observed in the Scots Bay and German Bank areas. Spawning activity could not be determined on Seal Island or Browns due to a lack of fishing or survey effort. Trinity Ledge again had minimal spawning.
Maintain biomass of each component	Although there is uncertainty associated with the biomass estimates, longer-term trends in biomass appear to be evident for the SW Nova Scotia/Bay of Fundy spawning component: a decreasing trend in the German Bank area from 1999 to present and an increasing trend in the Scots Bay area since 2005. The biomass of spawning fish estimated to be on Trinity Ledge from 2012 to 2014 is low relative to values observed in the early 2000s.
Maintain broad age composition	There is currently a broad range of ages in the commercial landings (1-11), as well as in the acoustic survey catch at age (1-11). In 2013 and 2014, the proportion of the catch older than age 5 was 21% and 22% (by numbers) respectively, which is the 2nd and 3rd highest proportion of age 5+ caught since 1994.
Maintain long spawning period	Start of spawning in 2013 and 2014 for Scots Bay was earlier than previously recorded based on acoustic survey results since 1999. Spawning in the German Bank area appeared to start about the same time in both years and in agreement with the previous five years but displays a trend of an earlier end date. Therefore, there appear to be slight changes in the spawning periods on the two major spawning grounds. Minimal spawning occurred on Trinity Ledge.
Fishing mortality at or below $F_{0.1}$	Fishing mortality could not be determined. Relative exploitation rates based on acoustic SSB and landings increased slightly in 2013 and then decreased near to the 2012 level in 2014.
Maintain spatial and temporal diversity of spawning	Spawning in the German Bank area displays a trend of an earlier end date. Spatially, the German Bank area had a similar distribution to previous years, extending slightly further south in 2013 than previous years. Duration of spawning in Scots Bay was extended slightly in comparison to previous years as earlier start dates occurred. Spatially, the Scots Bay area had a wider distribution than in previous years, extending throughout the strata box. Therefore, spawning periods are being maintained both temporally and spatially on the two major spawning grounds Trinity Ledge spawning is very restricted in space and time.
Maintain biomass at moderate to high levels	Biomass estimates have fluctuated about the LRP since 2010. Confidence intervals include the LRP in three of the last four years the exception being 2012 when the confidence interval was above the LRP.
Maintain three-year moving average above the lower reference point	The three-year moving average increased above the LRP in 2011 and changed very little in 2012. Since 2012, the three-year moving biomass average has been increasing slightly each year.

Table 26A. Herring catch at age for the 2013 Offshore Banks fisheries with numbers caught (thousands), weight (t) and percent, average length and average weight by age.

2013 Parameter	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	0	69	713	1,415	2,643	2,875	1,892	762	225	23	30	10,647
% numbers	0%	1%	7%	13%	25%	27%	18%	7%	2%	0%	0%	100%
Catch wt. (t)	0	4	64	156	339	423	327	141	48	6	8	1,515
% catch wt.	0%	0%	4%	10%	22%	28%	22%	9%	3%	0%	0%	100%
Avg. len (cm)	12.3	19.6	23.4	25.0	26.2	27.3	28.6	29.2	30.5	32.5	32.3	26.9
Avg. wt. (g)	12.3	53.3	89.2	110.3	128.4	147.3	173.1	184.6	211.6	257.0	253.2	142.3

Table 26B. Herring catch at age for the 2014 Offshore Banks fisheries with numbers caught (thousands), weight (t) and percent, average length and average weight by age. A dash (-) indicates no data.

2014 Parameter	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	0	13	96	62	61	96	56	23	4	-	-	412
% numbers	0%	3%	23%	15%	15%	23%	14%	6%	1%	-	-	100%
Catch wt. (t)	0	0	9	8	10	15	10	5	1	-	-	58
% catch wt.	0%	1%	15%	14%	17%	26%	17%	8%	1%	-	-	100%
Avg. len (cm)	15.1	18.0	23.3	25.8	27.5	27.5	28.4	29.5	29.5	-	-	26.2
Avg. wt. (g)	21.5	38.4	91.3	130.3	163.4	159.3	177.1	202.3	201.3	-	-	141.1

Table 27. Herring abundance indices from the July bottom trawl survey (stratified numbers per tow): 1970-2014. Note 2005 had duplicate coverage of the entire area with comparative surveys by the CCGS Alfred Needler and CCGS Templeman research vessels (shaded rows). For 2005, t = Templeman and n = Alfred Needler.

		4V only strata 440/452		4W Only strata 453/466		4X Only strata 470/495		4WX combined strata 453/495		4X BOF strata 480/495		4WX Offshore Banks strata 455/478		4VWX All Strata strata 440/498	
Year	Cruise	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
1970	A175/176	12.8	9.6	4.9	2.4	1.6	0.6	4.1	1.5	1.0	0.6	5.7	2.4	6.5	3.1
1971	A188/189	4.4	4.4	2.6	1.2	3.6	2.6	4.0	1.9	1.4	1.0	5.3	2.8	4.0	1.9
1972	A200/201	4.5	3.7	1.7	1.0	0.5	0.1	1.4	0.6	0.3	0.1	2.0	1.0	2.3	1.1
1973	A212/213	19.2	19.2	0.4	0.3	1.0	0.4	0.9	0.3	1.0	0.4	0.9	0.4	6.1	5.4
1974	A225/226	0.0	0.0	0.2	0.0	1.0	0.4	0.7	0.3	1.4	0.6	0.5	0.2	0.6	0.2
1975	A236/237	2.2	2.2	0.8	0.4	0.7	0.4	0.9	0.4	1.3	0.7	0.7	0.4	1.3	0.7
1976	A250/251	0.0	0.0	0.1	0.1	0.5	0.3	0.4	0.2	0.9	0.6	0.1	0.1	0.3	0.2
1977	A265/266	1.6	1.4	0.0	0.0	0.8	0.5	0.5	0.3	1.5	0.9	0.1	0.1	0.9	0.5
1978	A279/280	0.0	0.0	0.5	0.5	0.1	0.0	0.4	0.3	0.1	0.0	0.5	0.5	0.3	0.2
1979	A292/293	0.0	0.0	0.0	0.0	1.0	0.7	0.6	0.5	1.5	1.3	0.2	0.2	0.4	0.3
1980	A306/307	0.0	0.0	0.0	0.0	0.8	0.8	0.5	0.5	1.6	1.6	0.0	0.0	0.4	0.4
1981	A321/322	0.0	0.0	0.0	0.0	2.3	2.1	1.5	1.4	4.6	4.1	0.0	0.0	1.1	1.0
1982	H080/081	0.0	0.0	0.5	0.3	1.9	1.4	1.9	1.1	0.8	0.3	2.5	1.7	1.3	0.8
1983	N012/013	0.1	0.0	2.6	1.2	2.2	1.0	2.4	0.8	3.1	1.6	2.1	1.0	1.7	0.6
1984	N031/032	4.0	2.9	3.3	1.2	10.5	6.8	7.0	3.6	4.6	2.5	8.5	5.4	6.2	2.7
1985	N048/049	0.0	0.0	6.6	3.8	0.3	0.1	3.4	1.8	0.4	0.2	5.0	2.9	2.4	1.3
1986	N065/066	0.5	0.4	30.8	26.7	16.0	14.3	23.4	15.0	24.9	22.3	23.4	20.3	16.9	10.8
1987	N85/86/87	117.4	90.5	17.0	11.3	4.0	1.8	10.4	5.6	6.3	2.8	12.9	8.6	40.8	28.0
1988	N105/106	0.3	0.2	2.7	1.2	1.5	0.5	2.1	0.6	2.3	0.8	2.0	0.9	1.6	0.5
1989	N123/124	3.6	3.1	11.8	3.4	4.5	1.2	8.0	1.8	4.9	1.4	9.8	2.7	6.7	1.5
1990	N139/140	0.3	0.2	7.4	3.6	3.4	1.0	5.3	1.9	3.4	0.8	6.5	2.9	3.9	1.4
1991	N154/H231	10.2	9.9	13.0	8.8	5.0	1.8	10.9	5.9	4.9	2.3	14.3	9.0	10.7	5.1
1992	N173/174	0.2	0.1	16.2	6.6	40.8	15.7	29.1	8.7	41.8	22.2	23.6	7.4	20.9	6.3
1993	N189/190	1.0	0.6	6.3	2.5	30.4	8.5	18.8	4.6	27.6	10.3	15.0	4.7	13.8	3.3
1994	N221/222	25.7	22.0	108.4	58.9	45.9	18.4	75.9	30.4	51.1	26.0	91.1	45.1	61.6	22.7
1995	N226/227	7.9	6.1	100.5	47.9	28.4	12.8	63.9	24.5	11.4	5.4	92.7	37.6	46.8	17.2
1996	N246/247	0.2	0.1	53.2	24.5	27.1	14.1	39.4	14.3	32.1	20.8	46.5	19.5	27.5	9.9
1997	N726/734	0.2	0.1	34.6	10.1	51.3	39.3	43.2	20.8	72.8	60.9	29.3	7.7	30.2	14.5
1998	N827/832	0.8	0.3	147.6	39.9	54.8	14.5	99.5	20.7	45.6	19.4	130.3	30.3	69.7	14.6
1999	N925/929	24.9	15.2	264.2	101.0	199.4	130.2	229.8	83.8	251.4	203.6	226.2	74.4	163.7	58.6
2000	NED2000-426/431	2.0	0.6	146.3	40.6	38.7	7.4	90.6	20.0	29.5	9.1	124.7	30.5	63.8	13.9
2001	NED2001-032/037	53.9	49.2	152.7	81.3	139.5	52.5	145.9	47.7	181.3	80.9	132.4	60.9	116.7	36.0
2002	NED2002-037/040	4.9	2.6	172.7	81.3	151.9	55.6	161.9	48.6	170.9	85.3	162.6	61.1	114.4	34.0
2003	NED2003-036/042	4.9	2.0	207.8	145.4	58.7	14.5	130.6	70.5	50.3	14.0	175.8	108.6	92.5	49.2
2004	TEL2004-529/530	1.4	0.4	307.6	134.5	285.0	147.4	295.9	100.2	198.0	170.9	355.6	127.6	209.2	70.7
2005t	TEL2005-605/633	7.4	2.2	13.7	8.7	130.5	23.1	74.1	13.7	51.8	34.4	86.0	6.6	53.9	9.1
2005n	NED2005-027/034	13.6	5.4	36.0	13.1	86.2	38.5	63.1	20.9	61.0	30.2	68.2	28.4	47.7	14.7
2006	NED2006-030/036	15.2	11.0	133.3	59.2	40.7	15.5	85.7	29.7	26.7	9.8	118.6	45.6	66.4	21.0
2007	TEL2007-745	0.9	0.5	20.0	8.0	59.9	17.3	40.7	9.8	85.8	26.9	19.0	6.2	29.1	6.9
2008	TEM2008-830	2.0	0.8	46.8	24.7	40.9	10.1	43.7	12.9	50.8	14.3	40.2	18.1	31.1	9.1
2009	NED2009-027	6.1	4.8	44.6	21.0	61.4	12.1	53.3	11.9	85.4	18.1	38.6	15.9	40.7	8.4
2010	NED2010-027	38.4	31.2	163.4	60.8	256.4	215.5	211.5	115.4	50.8	10.2	300.5	178.0	158.3	81.0
2011	NED2011-025	15.4	10.6	83.8	21.5	151.3	83.9	118.7	44.9	219.0	131.1	71.3	16.2	87.1	31.4
2012	NED2012-022	8.7	3.5	108.3	40.0	122.8	31.6	115.8	25.3	139.2	40.3	107.7	33.1	83.3	17.7
2013	NED2013-022	91.8	54.9	91.2	19.9	115.6	30.4	103.8	18.5	121.6	41.7	98.1	18.9	97.9	19.9
2014	NED2014-018	11.4	4.9	101.1	54.2	81.7	27.7	91.1	29.8	96.1	39.7	90.9	41.3	66.7	21.0
Overall Mean		11.3	8.2	58.0	25.5	51.4	23.4	54.7	19.0	48.4	25.5	59.7	23.6	41.5	14.3
Minimum		0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.2	0.1	0.0	0.0	0.0	0.3	0.2
Maximum		117.4	90.5	307.6	145.4	285.0	215.5	295.9	115.4	251.4	203.6	355.6	178.0	209.2	81.0

Table 28. Coastal Nova Scotia spawning component summary of A) herring landings (t) from gillnet fisheries 1996-2014, B) spawning biomass (t) from acoustic surveys in the Coastal Nova Scotia spawning component from 1996-2014, and C) estimated exploitation as calculated as landings/ SSB (%). Note that shaded cells include mapping surveys that estimated biomass based on visual sounder estimates. Data prior to 2003 calculated with the CIF are not available and estimates of exploitation were not made for these years. A dash (-) indicates no data; n/a indicates not applicable; 'n/s' indicates no survey.

A) Landings (t)	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Average Landings Last 5 yr.**	**Average Landings All Years**
Little Hope/Port Mouton Catch	-	490	1,170	2,919	2,043	2,904	3,982	4,526	1,267	2,239	3,133	1,506	1,108	3,731	3,106	2,564	2,150	2,499	3,596	2,785	2,498
Little Hope/Port Mouton Allocation	-	-	-	-	1,495	1,170	1,410	2,248	3,028	3,162	3,952	4,008	2,944	2,172	2,454	2,094	2,188	2,387	3,577	-	-
Halifax/Eastern Shore Catch	1,280	1,520	1,100	1,628	1,350	1,898	3,334	2,727	4,176	3,446	3,348	3,727	2,381	6,045	2,456	1,040	799	1,390	1,163	2,070	2,331
Halifax/Eastern Shore Allocation	-	-	-	-	1,425	1,313	1,403	1,952	3,638	3,802	4,323	5,367	5,103	3,857	4,373	4,188	2,920	2,427	1,959	-	-
Glace Bay	-	170	1,730	1,040	834	1,204	3,058	1,905	1,481	626	85	45	12	4	11	0	7	2	1	4	679
Bras d'Or Lakes	170	160	120	31	56	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	29
Total	1,450	2,340	4,120	5,621	4,280	6,004	10,369	9,109	6,981	6,316	6,575	5,275	3,468	9,620	5,419	3,484	2,928	3,891	4,760	4,096	5,536

B) Survey SSB (t)	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**SSB Average Last 5 yr.**	**SSB Average All years**
Little Hope/Port Mouton	n/s	n/s	14,100	15,800	5,200	21,300	56,000	53,100	22,500	44,700	24,100	2,800	14,500	36,600	26,700	28,796	12,756	74,532	46,077	37,664	29,386
Halifax/Eastern Shore	n/s	n/s	8,300	20,200	10,900	16,700	41,500	92,600	28,400	36,950	68,900	28,300	30,300	54,200	27,700	5,498	3,668	6,870	9,586	10,664	28,857
Glace Bay	n/s	n/s	-	2,000	-	21,200	7,700	31,500	n/s	3,180	n/s	240	500	100	8	51	n/s	50	n/s	52	6,048
Bras d'Or Lakes	n/s	n/s	-	530	70	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	300

C) Survey SSB with CIF	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Average Last 5 yr.**	**Average All years**
Little Hope/Port Mouton	n/a	n/a	8%	18%	39%	14%	7%	9%	6%	5%	13%	54%	8%	10%	12%	9%	17%	3%	8%	10%	14%
Halifax/Eastern Shore	n/a	n/a	13%	8%	12%	11%	8%	3%	15%	9%	5%	13%	8%	11%	9%	19%	22%	20%	12%	15%	11%
Glace Bay	n/a	n/a	-	52%	-	6%	40%	6%	-	20%	-	19%	2%	4%	-	-	-	-	-	4%	18%
Bras d'Or Lakes	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 29A. Herring catch at age for the 2013 Coastal Nova Scotia gillnet and trap (46t) fisheries with numbers caught (thousands), weight (t) and percent, average length and average weight by age. A dash (-) indicates no data.

Coastal NS Gillnet and Trap (3,937t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	0	136	216	524	2,271	6,341	5,520	3,538	738	123	295	19,703
% numbers	0%	1%	1%	3%	12%	32%	28%	18%	4%	1%	1%	100%
Catch wt. (t)	0	8	20	78	406	1,232	1,136	770	177	33	78	3,937
% catch wt.	0%	0%	1%	2%	10%	31%	29%	20%	5%	1%	2%	100%
Avg. len (cm)	10.7	19.5	22.9	26.9	28.4	29.1	29.6	30.1	31.0	32.2	32.0	29.3
Avg. wt. (g)	7.7	56.4	91.5	149.0	178.6	194.3	205.9	217.6	240.1	268.8	263.6	199.8
Halifax/Eastern Shore Gillnet (1,390t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	-	9	146	822	2,362	1,880	1,277	264	29	86	6,875
% numbers	-	-	0%	2%	12%	34%	27%	19%	4%	0%	1%	100%
Catch wt. (t)	-	-	1	24	149	459	385	277	64	8	23	1,390
% catch wt.	-	-	0%	2%	11%	33%	28%	20%	5%	1%	2%	100%
Avg. len (cm)	-	-	26.2	27.5	28.5	29.1	29.5	30.0	31.1	32.3	32.2	29.4
Avg. wt. (g)	-	-	135.8	162.5	181.3	194.1	204.7	217.1	244.0	274.0	271.4	202.2
Little Hope Gillnet (2,499t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	24	81	336	1,382	3,908	3,603	2,248	472	95	209	12,357
% numbers	-	0%	1%	3%	11%	32%	29%	18%	4%	1%	2%	100%
Catch wt. (t)	-	2	10	50	247	762	745	490	112	25	54	2,499
% catch wt.	-	0%	0%	2%	10%	31%	30%	20%	4%	1%	2%	100%
Avg. len (cm)	-	24.0	25.4	26.9	28.4	29.2	29.7	30.2	31.0	32.2	31.9	29.5
Avg. wt. (g)	-	100.7	123.2	148.0	179.0	195.1	206.8	218.1	238.1	267.2	260.4	202.3

Table 29B. Herring catch at age for the 2014 Coastal Nova Scotia gillnet fisheries (trap = 0t) with numbers caught (thousands), weight (t) and percent, average length and average weight by age. A dash (-) indicates no data.

Coastal NS Gillnet (4,760t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	0	0	695	3,788	4,646	6,121	4,540	2,566	874	31	55	23,316
% numbers	0%	0%	3%	16%	20%	26%	19%	11%	4%	0%	0%	100%
Catch wt. (t)	0	0	108	638	870	1,274	1,012	618	215	9	15	4,760
% catch wt.	0%	0%	2%	13%	18%	27%	21%	13%	5%	0%	0%	100%
Avg. len (cm)	13.5	17.3	26.6	27.3	28.1	29.0	29.6	30.3	30.5	32.3	31.5	28.8
Avg. wt. (g)	15.4	35.2	156.1	168.4	187.3	208.2	222.8	240.6	246.2	301.2	279.2	204.2
Halifax/Eastern Shore Gillnet (1,163t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	-	139	868	1,257	1,454	1,213	637	153	2	7	5,730
% numbers	-	-	2%	15%	22%	25%	21%	11%	3%	0%	0%	100%
Catch wt. (t)	-	-	21	145	237	303	266	150	37	1	2	1,163
% catch wt.	-	-	2%	12%	20%	26%	23%	13%	3%	0%	0%	100%
Avg. len (cm)	-	-	26.5	27.3	28.3	29.1	29.5	30.2	30.4	33.0	31.4	28.8
Avg. wt. (g)	-	-	152.7	167.2	189.0	208.5	219.0	236.0	243.6	317.9	275.0	203.0
Little Hope Gillnet (3,596t)	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11+**	**Total**
Numbers (x1,000)	-	-	554	2,919	3,389	4,665	3,327	1,929	721	28	48	17,580
% numbers	-	-	3%	17%	19%	27%	19%	11%	4%	0%	0%	100%
Catch wt. (t)	-	-	87	493	633	971	746	467	178	9	13	3,596
% catch wt.	-	-	2%	14%	18%	27%	21%	13%	5%	0%	0%	100%
Avg. len (cm)	-	-	26.7	27.3	28.1	29.0	29.6	30.3	30.5	32.3	31.6	28.8
Avg. wt. (g)	-	-	157.1	168.7	186.7	208.1	224.3	242.2	246.8	299.7	279.8	204.6

Table 30. Monthly landings (t) from weirs located in New Brunswick from 1978 to 2014.

YEAR	MONTH												Total
	Jan	Feb	Mar	Apr	May	June	July	Aug.	Sept	Oct	Nov	Dec	
1978	3	0	0	0	512	802	5,499	10,275	10,877	4,972	528	132	33,599
1979	535	96	0	0	25	1,120	7,321	9,846	4,939	5,985	2,638	74	32,579
1980	0	0	0	0	36	119	1,755	5,572	2,352	1,016	216	0	11,066
1981	0	0	0	0	70	199	4,431	3,911	2,044	2,435	1,686	192	14,968
1982	0	17	0	0	132	30	2,871	7,311	7,681	3,204	849	87	22,181
1983	0	0	0	0	65	29	299	2,474	5,382	3,945	375	0	12,568
1984	0	0	0	0	6	3	230	2,344	2,581	3,045	145	0	8,353
1985	0	0	0	0	22	89	4,217	8,450	6,910	4,814	2,078	138	26,718
1986	43	0	0	0	17	0	2,480	10,114	5,997	6,233	2,564	67	27,516
1987	39	21	6	12	10	168	2,575	10,893	6,711	5,362	703	122	26,621
1988	0	12	1	90	657	287	5,993	11,975	8,375	8,457	2,343	43	38,235
1989	0	24	0	95	37	385	8,315	15,093	10,156	7,258	2,158	0	43,520
1990	0	0	0	0	93	20	4,915	14,664	12,207	7,741	168	0	39,808
1991	0	0	0	0	57	180	4,649	10,319	6,392	2,028	93	0	23,717
1992	0	0	0	15	50	774	5,477	10,989	9,597	4,395	684	0	31,981
1993	0	0	0	0	14	168	5,561	14,085	8,614	2,406	470	10	31,328
1994	0	0	0	18	0	55	4,529	10,592	3,805	1,589	30	0	20,618
1995	0	0	0	0	15	244	4,517	8,590	3,956	896	10	0	18,228
1996	0	0	0	0	19	676	4,819	7,767	1,917	518	65	0	15,781
1997	0	0	0	8	153	1,017	6,506	7,396	5,316	0	0	0	20,396
1998	0	0	0	0	560	713	3,832	8,295	5,604	525	0	0	19,529
1999	0	0	0	0	690	805	5,155	9,895	2,469	48	0	0	19,063
2000	0	0	0	0	10	7	2,105	7,533	4,940	1,713	69	0	16,376
2001	0	0	0	0	35	478	3,931	8,627	5,514	1,479	0	0	20,064
2002	0	0	0	0	84	20	1,099	6,446	2,878	1,260	20	0	11,807
2003	0	0	0	0	257	250	1,423	3,554	3,166	344	10	0	9,003
2004	0	0	0	0	21	336	2,694	8,354	8,298	913	3	0	20,620
2005	0	0	0	0	0	213	802	7,145	3,729	740	11	0	12,639
2006	0	0	0	0	8	43	1,112	3,731	3,832	2,328	125	462	11,641
2007	182	0	20	30	84	633	3,241	11,363	7,637	6,567	314	73	30,145
2008	0	0	0	0	0	81	1,502	2,479	1,507	389	49	32	6,041
2009	0	0	0	0	5	239	699	1,111	1,219	330	0	0	3,603
2010	0	0	0	6	64	1,912	2,560	3,903	1,933	247	46	0	10,671
2011	0	0	0	0	0	250	656	1,097	500	140	0	0	2,643
2012	0	0	0	0	29	140	5	5	98	217	0	0	494
2013	0	0	0	0	7	612	1,517	1,797	1,051	919	0	0	5,902
2014	0	0	0	0	0	70	130	147	449	774	0	0	1,571
NB Average Landings (t)	22	5	1	7	104	356	3,228	7,247	4,882	2,574	499	39	18,962
NB Minimum Landings (t)	0	0	0	0	0	0	5	5	98	0	0	0	494
NB Maximum Landings (t)	535	96	20	95	690	1,912	8,315	15,093	12,207	8,457	2,638	462	43,520

Table 31A. Herring catch at age for the 2013 New Brunswick juvenile fisheries (weir and shutoff combined) with numbers caught (thousands), weight (t) and percent, average length and average weight by age.

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	35,483	126,917	10,475	643	436	216	52	14	1	-	0	174,236
% numbers	20%	73%	6%	0%	0%	0%	0%	0%	0%	-	0%	100%
Catch wt. (t)	427	5,108	594	61	55	31	8	2	0	-	0	6,286
% catch wt.	7%	81%	9%	1%	1%	0%	0%	0%	0%	-	0%	100%
Avg. len (cm)	12.9	18.2	19.9	23.4	25.6	26.7	27.3	27.9	29.0	-	32.5	17.3
Avg. wt. (g)	12.0	40.2	56.7	95.5	125.3	143.4	155.1	167.4	193.4	-	290.7	36.1

Table 31B. Herring catch at age for the 2014 New Brunswick juvenile fisheries (weir and shutoff combined) with numbers caught (thousands), weight (t) and percent, average length and average weight by age.

Parameters	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Total
Numbers (x1,000)	21,037	38,785	1,422	712	288	219	76	31	9	0	2	62,581
% numbers	34%	62%	2%	1%	0%	0%	0%	0%	0%	0%	0%	100%
Catch wt. (t)	300	1,492	142	102	48	40	15	7	2	0	1	2,149
% catch wt.	14%	69%	7%	5%	2%	2%	1%	0%	0%	0%	0%	100%
Avg. len (cm)	13.1	17.4	23.4	26.0	27.1	27.8	28.7	29.4	30.0	32.0	293.0	16.3
Avg. wt. (g)	14.2	38.5	100.1	143.5	166.1	181.0	202.7	221.4	237.3	293.0	11.4	34.3

FIGURES

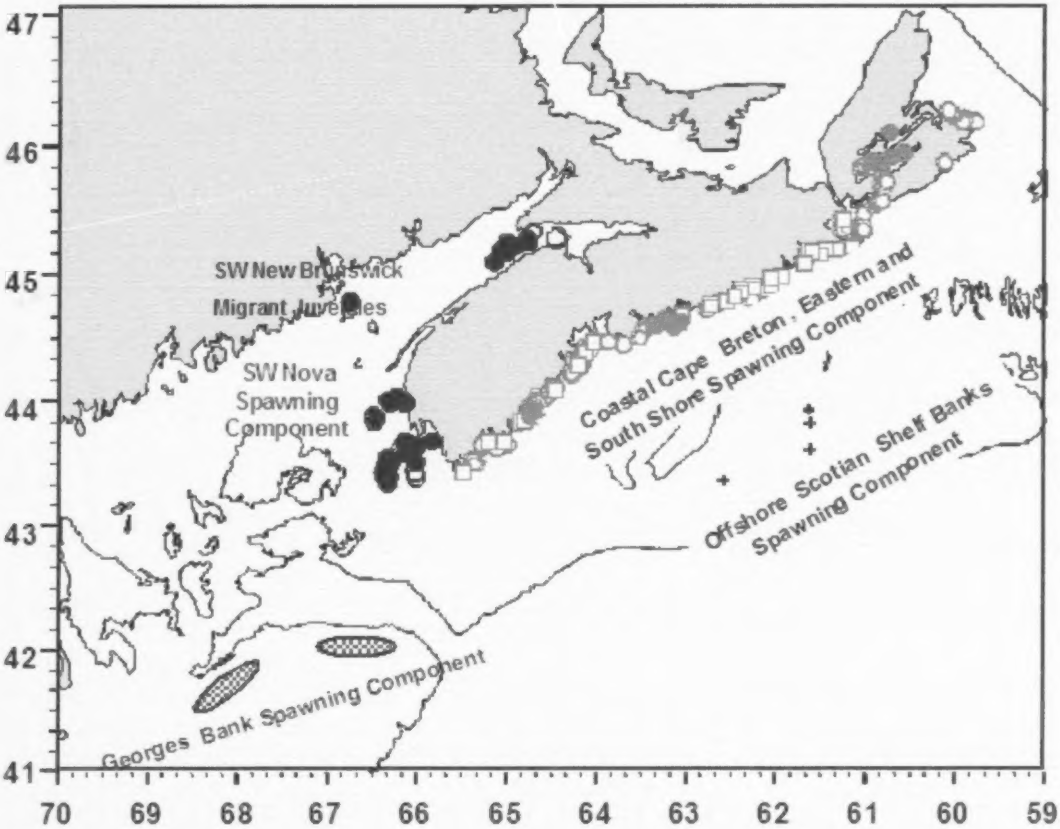

47
46
45
44
43
42
41
70
69
68
67
66
65
64
63
62
61
60
59
SW New Brunswick
Migrant Juveniles
SW Nova Spawning Component
Coastal Cape Breton, Eastern and South Shore Spawning Component
Offshore Scotian Shelf Banks Spawning Component
Georges Bank Spawning Component

Figure 1. Management units for herring in NAFO Divisions 4VWX and 5YZ showing locations of known current (solid) and historical (open) spawning locations.

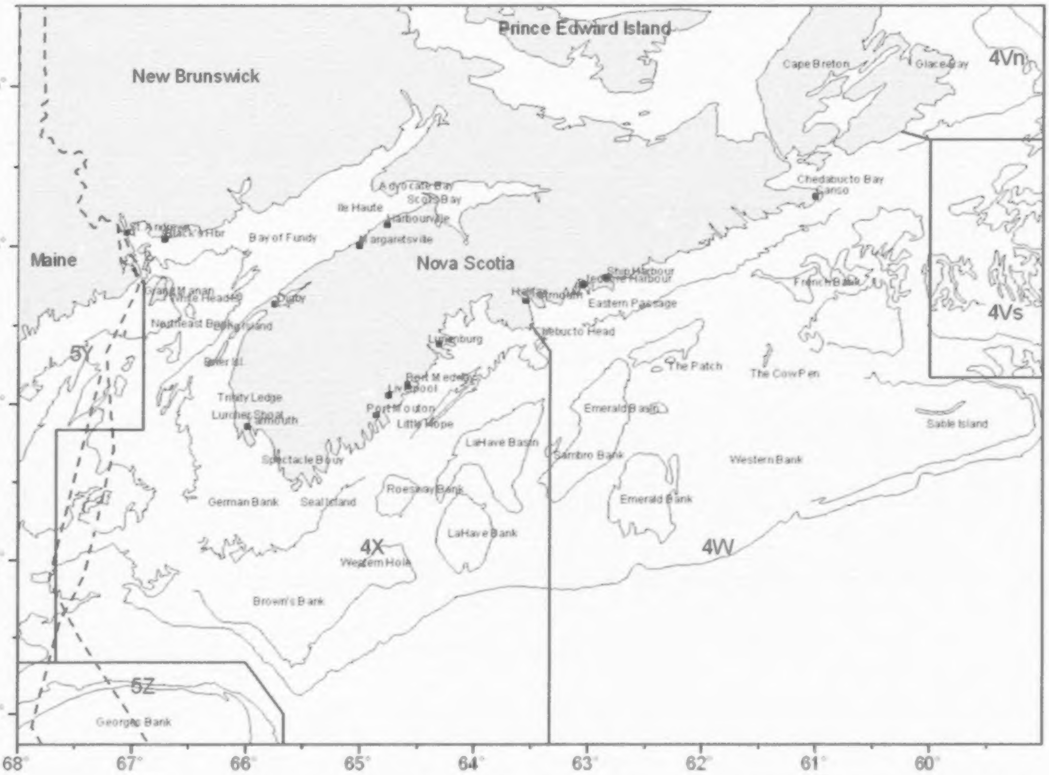

Prince Edward Island
New Brunswick
Cape Breton
Glace Bay
4Vn
Maine
Bay of Fundy
Ile Haute
Advocate Bay
Scots Bay
Harbourville
Margaretsville
Nova Scotia
Chedabucto Bay
Canso
Black's Hbr
Grand Manan
White Head
Digby
Northeast Bank
Brier Isl.
5Y
Lunenburg
Halifax
Ship Harbour
Eastern Passage
Chebucto Head
French Bank
4Vs
The Patch
The Cow Pen
Port Medway
Liverpool
Port Mouton
Little Hope
Trinity Ledge
Lurcher Shoal
Yarmouth
Emerald Basin
Sable Island
LaHave Basin
Sambro Bank
Western Bank
Spectacle Bouy
German Bank
Seal Island
Roseway Bank
Emerald Bank
LaHave Bank
4X
Western Hole
4W
Brown's Bank
5Z
Georges Bank
46°
45°
44°
43°
42°
68°
67°
66°
65°
64°
63°
62°
61°
60°

Figure 2. Place names and fishing locations for SWNB, Coastal Nova Scotia and Scotian Shelf/Bay of Fundy.

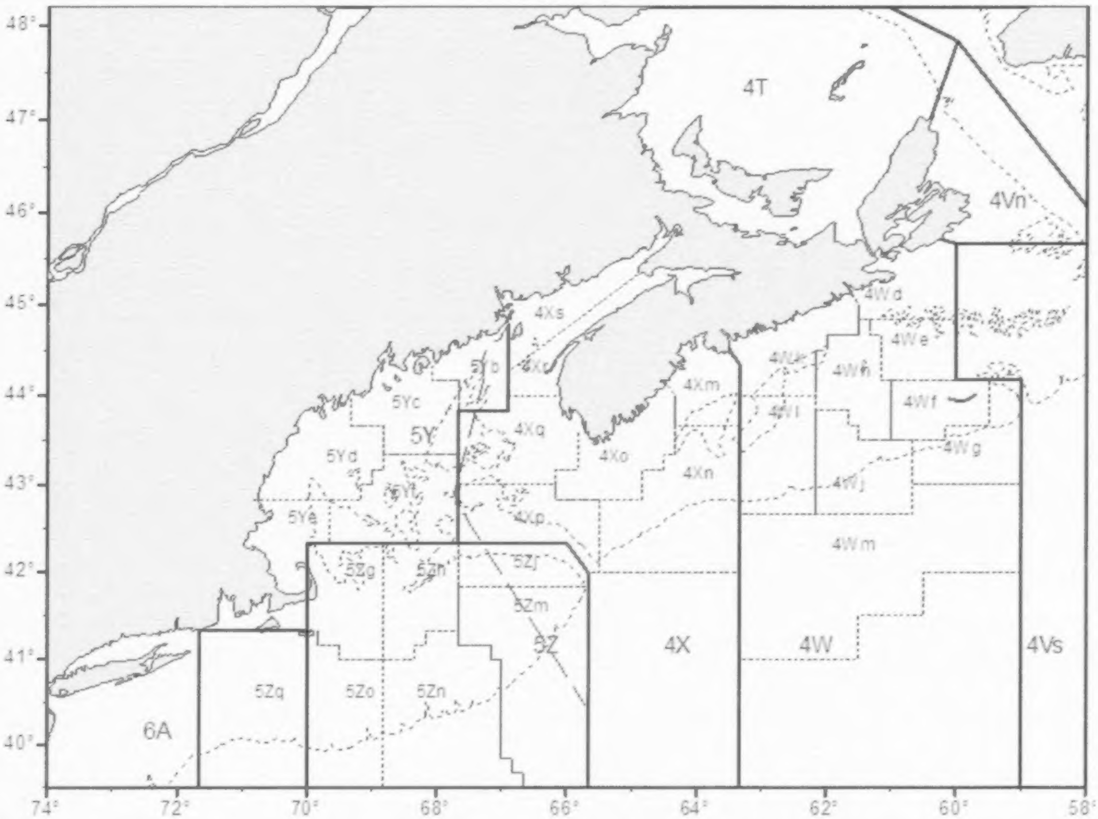
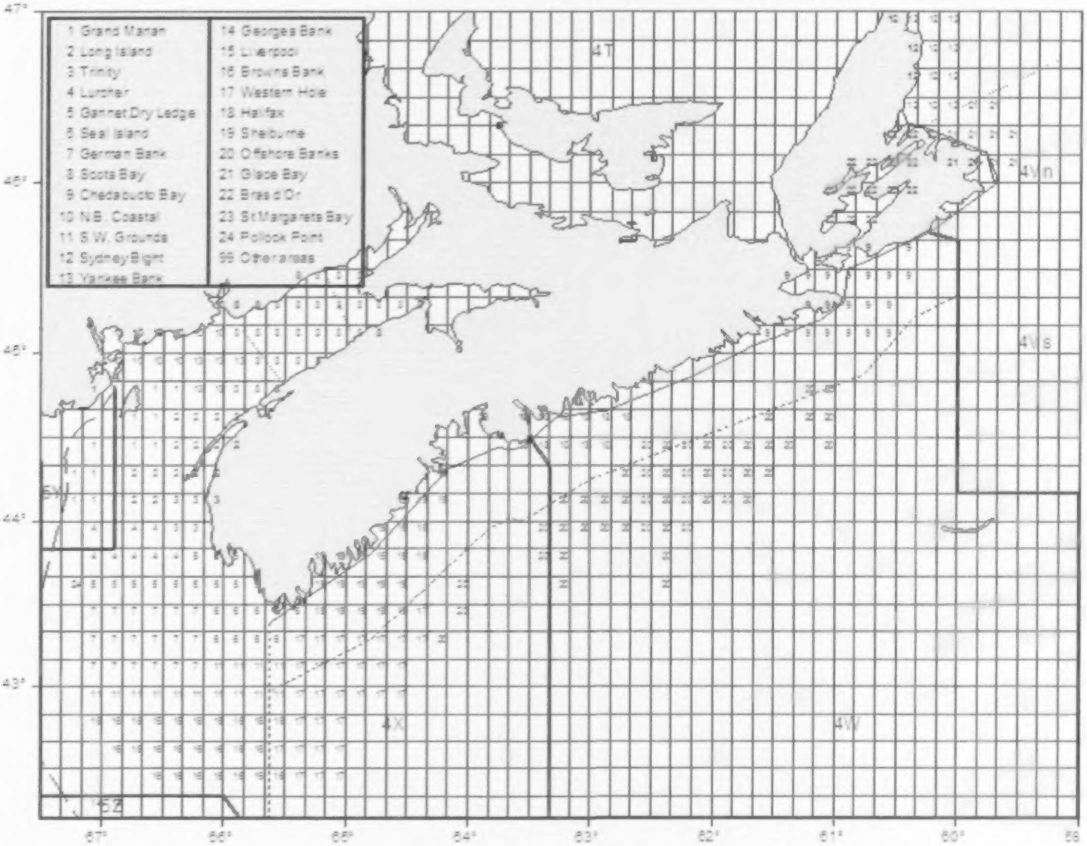

48°
47°
46°
45°
44°
43°
42°
41°
40°
4T
4Vn
4Wd
4Xs
4We
5Yb
4Xr
4Wk
4Wh
4Xm
4Wf
5Yc
4Xq
4Wl
5Y
5Yd
4Xo
4Wg
4Xn
4Wj
5Yf
5Ye
4Xp
4Wm
5Zg
5Zh
5Zj
5Zm
5Z
4X
4W
4Vs
5Zq
5Zo
5Zn
6A
74°
72°
70°
68°
66°
64°
62°
60°
58°

Figure 3. NAFO divisions, subareas, and unit areas used for sample and landings data aggregation.



1 Grand Manan
2 Long Island
3 Trinity
4 Lurcher
5 Gannet Dry Ledge
6 Seal Island
7 German Bank
8 Scots Bay
9 Chedabucto Bay
10 N.B. Coastal
11 S.W. Grounds
12 Sydney Bight
13 Yankee Bank
14 Georges Bank
15 Liverpool
16 Browns Bank
17 Western Hole
18 Halifax
19 Shelburne
20 Offshore Banks
21 Glace Bay
22 Bras d'Or
23 St Margarets Bay
24 Pollock Point
99 Other areas
4T
4Vn
4Vs
4X
4W
5Y
5Z
47°
46°
45°
44°
43°
67°
66°
65°
64°
63°
62°
61°
60°
59

Figure 4. Herring fishing ground areas by 10-mile boxes and management lines for NAFO divisions, 25-mile offshore line, coastal embayment line, and herring area lines.

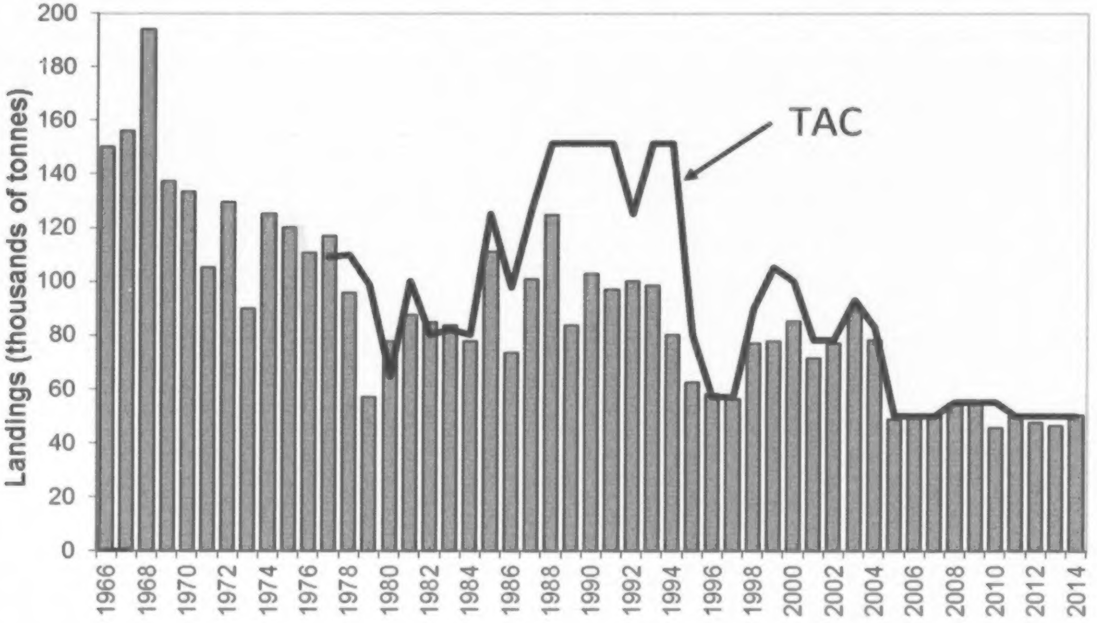


Figure 5. Annual adjusted herring landings [bars] and TAC [solid line] for the SWNS/BoF spawning component (4WX stock).

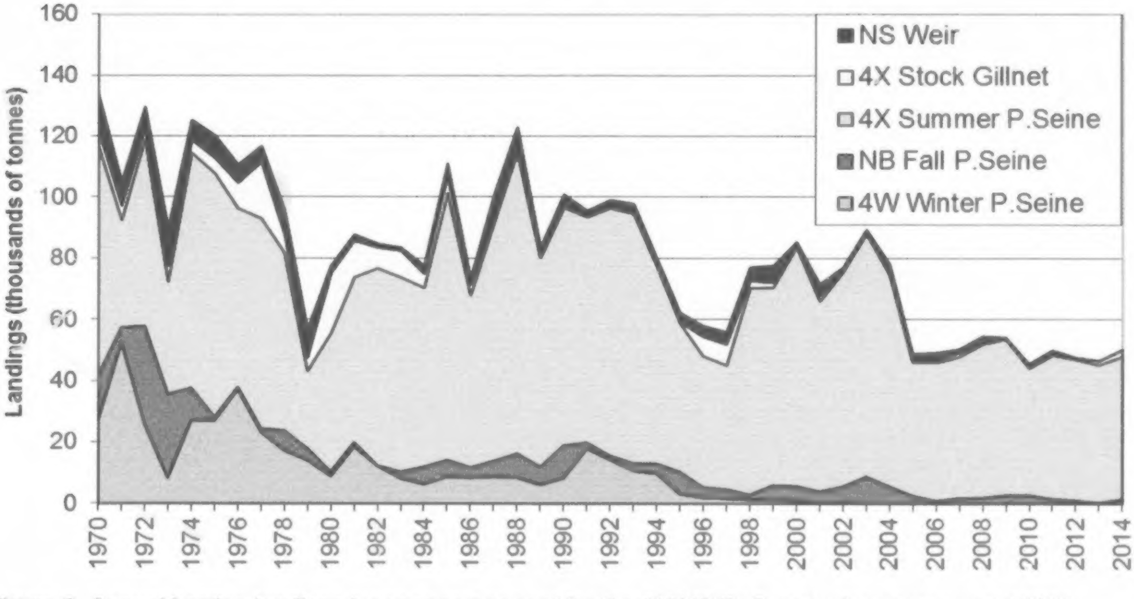


Figure 6. Annual herring landings by gear component for the SWNS/BoF spawning component (4WX stock) from 1970-2014.

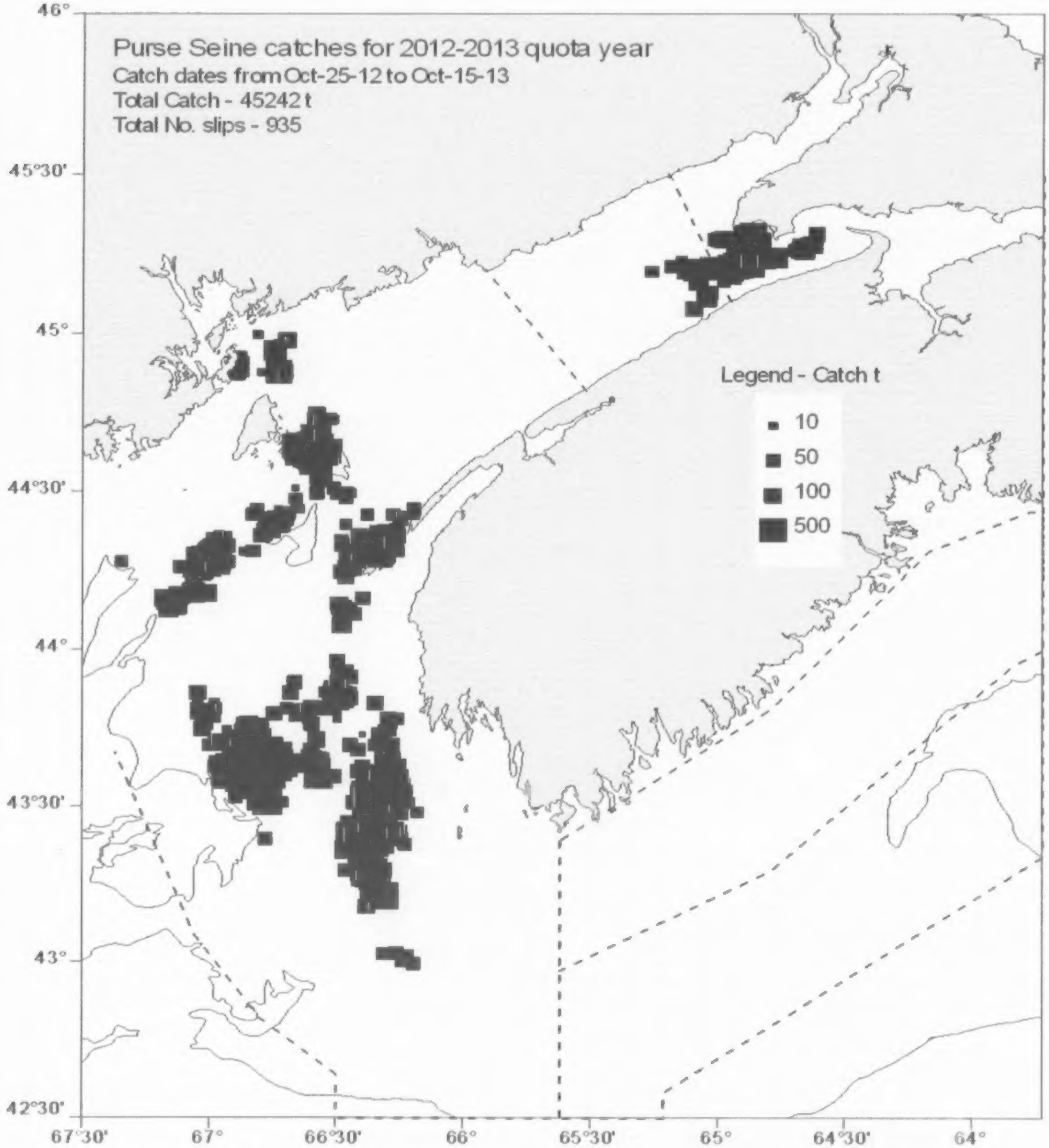

Purse Seine catches for 2012-2013 quota year
Catch dates from Oct-25-12 to Oct-15-13
Total Catch - 45242 t
Total No. slips - 935
Legend - Catch t
10
50
100
500
46°
45°30'
45°
44°30'
44°
43°30'
43°
42°30'
67°30'
67°
66°30'
66°
65°30'
65°
64°30'
64°

Figure 7A. The 2012-2013 quota year herring purse seine landings (t) for NAFO Division 4X (from Statistics Division MARFIS database).

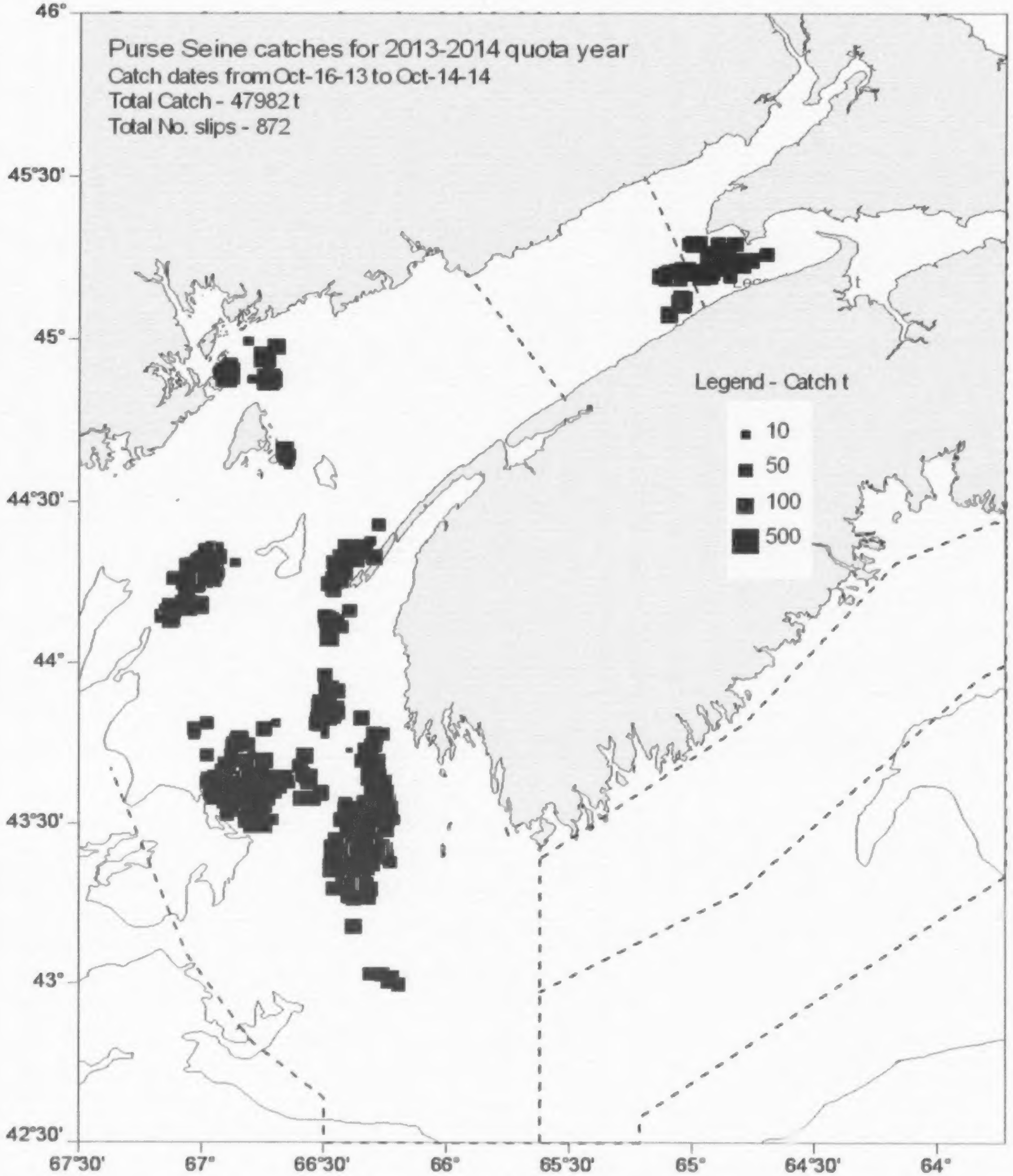

Purse Seine catches for 2013-2014 quota year
Catch dates from Oct-16-13 to Oct-14-14
Total Catch - 47982 t
Total No. slips - 872
Legend - Catch t
10
50
100
500
46°
45°30'
45°
44°30'
44°
43°30'
43°
42°30'
67°30'
67°
66°30'
66°
65°30'
65°
64°30'
64°

Figure 7B. The 2013-2014 quota year herring purse seine landings (t) for NAFO Division 4X (from Statistics Division MARFIS database).

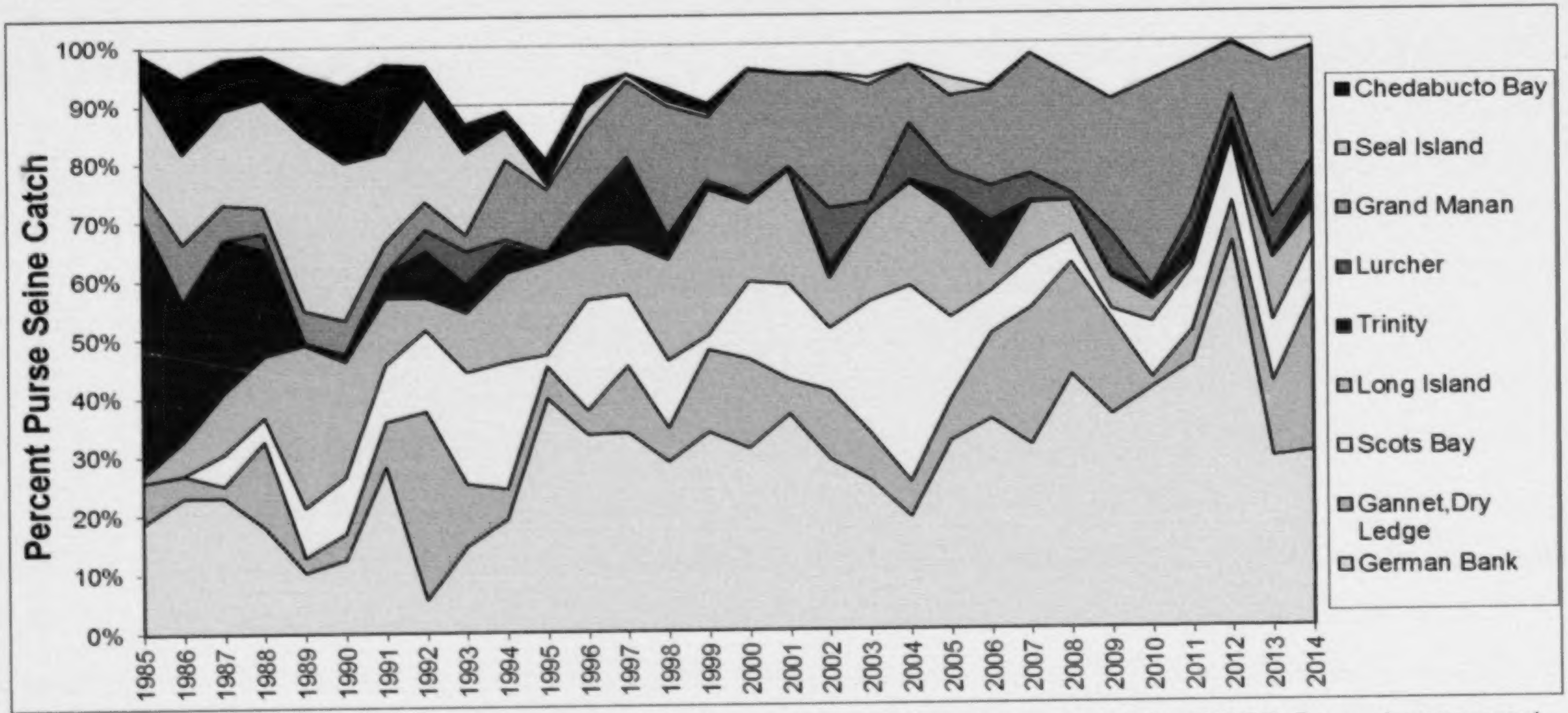


Figure 8. Herring purse seine catches as a proportion of overall landings (%) for selected fishing grounds in the SWNS/BoF spawning component from 1985-2014.

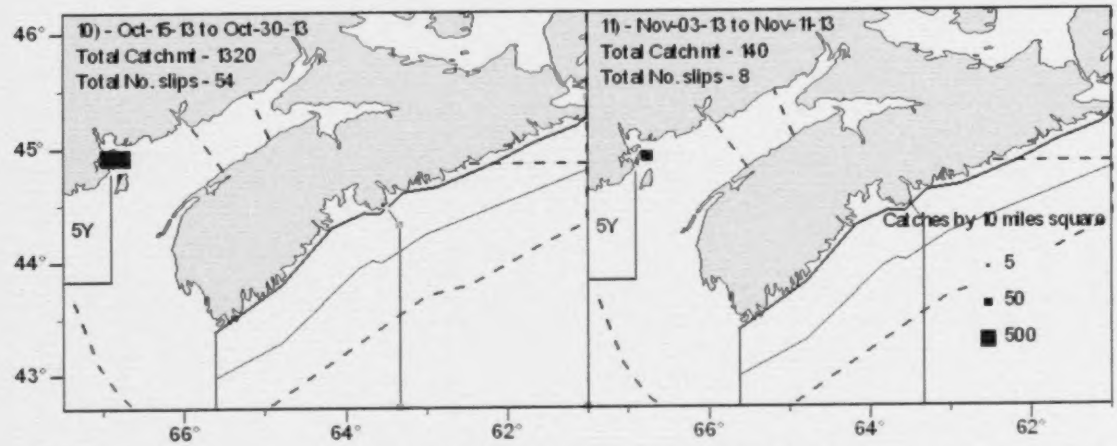

10) - Oct-15-13 to Oct-30-13
Total Catch mt - 1320
Total No. slips - 54
11) - Nov-03-13 to Nov-11-13
Total Catch mt - 140
Total No. slips - 8
5Y
5Y
Catches by 10 miles square
5
50
500
46°
45°
44°
43°
66°
64°
62°
66°
64°
62°

Figure 9A. Fall 2013 herring purse seine landings (t) by month in NAFO Division 4X (part of 2013-2014 quota year).

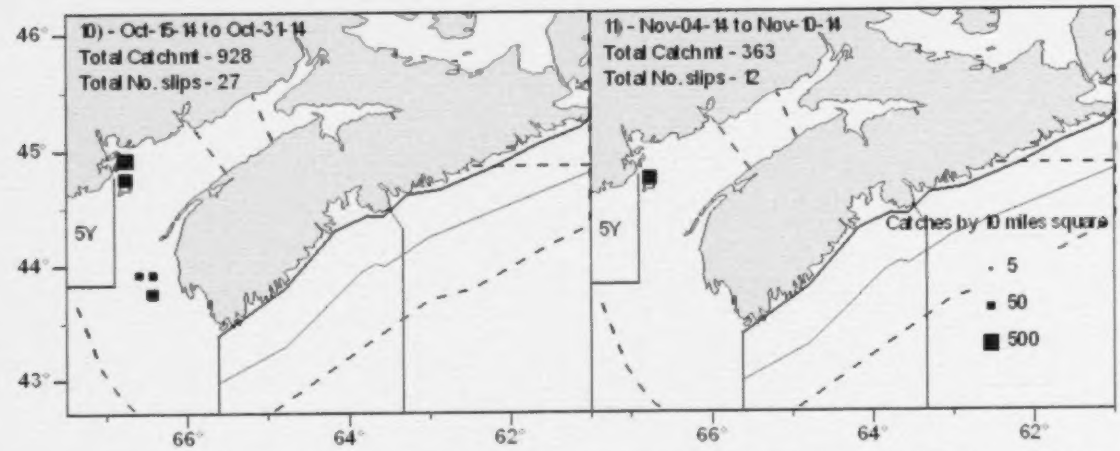

10) - Oct-15-14 to Oct-31-14
Total Catch mt - 928
Total No. slips - 27
11) - Nov-04-14 to Nov-10-14
Total Catch mt - 363
Total No. slips - 12
5Y
5Y
Catches by 10 miles square
5
50
500
46°
45°
44°
43°
66°
64°
62°
66°
64°
62°

Figure 9B. Fall 2014 herring purse seine landings (t) by month in NAFO Division 4X (part of 2014-2015 quota year).

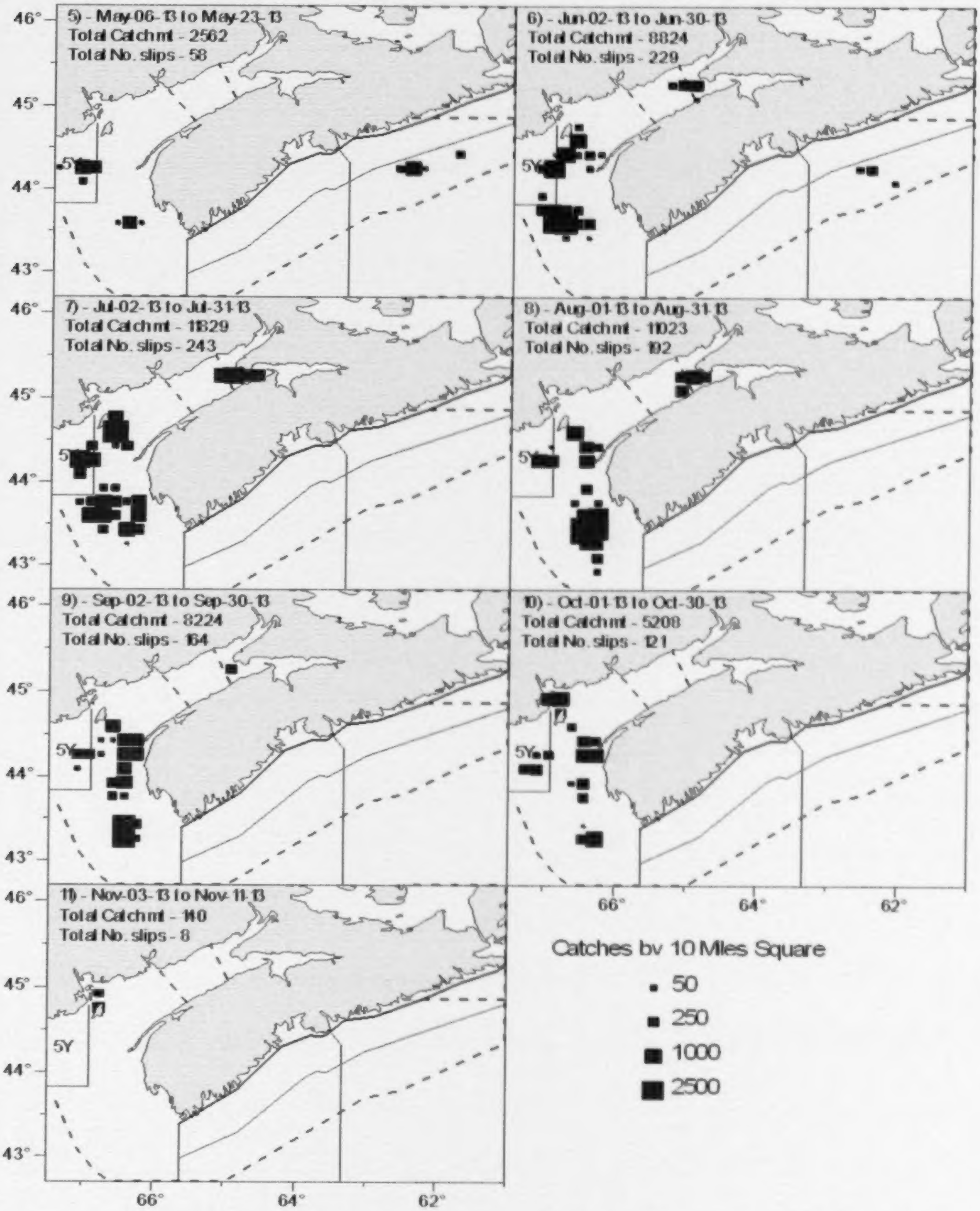

5) - May-06-13 to May-23-13
Total Catch mt - 2562
Total No. slips - 58
6) - Jun-02-13 to Jun-30-13
Total Catch mt - 8824
Total No. slips - 229
7) - Jul-02-13 to Jul-31-13
Total Catch mt - 11829
Total No. slips - 243
8) - Aug-01-13 to Aug-31-13
Total Catch mt - 11023
Total No. slips - 192
9) - Sep-02-13 to Sep-30-13
Total Catch mt - 8224
Total No. slips - 164
10) - Oct-01-13 to Oct-30-13
Total Catch mt - 5208
Total No. slips - 121
11) - Nov-03-13 to Nov-11-13
Total Catch mt - 140
Total No. slips - 8
5Y
46°
45°
44°
43°
66°
64°
62°
Catches by 10 Miles Square
50
250
1000
2500

Figure 10A. 2013 herring purse seine landings (t) by month in NAFO Divisions 4WX for calendar year 2013 (from Statistics Division MARFIS database).

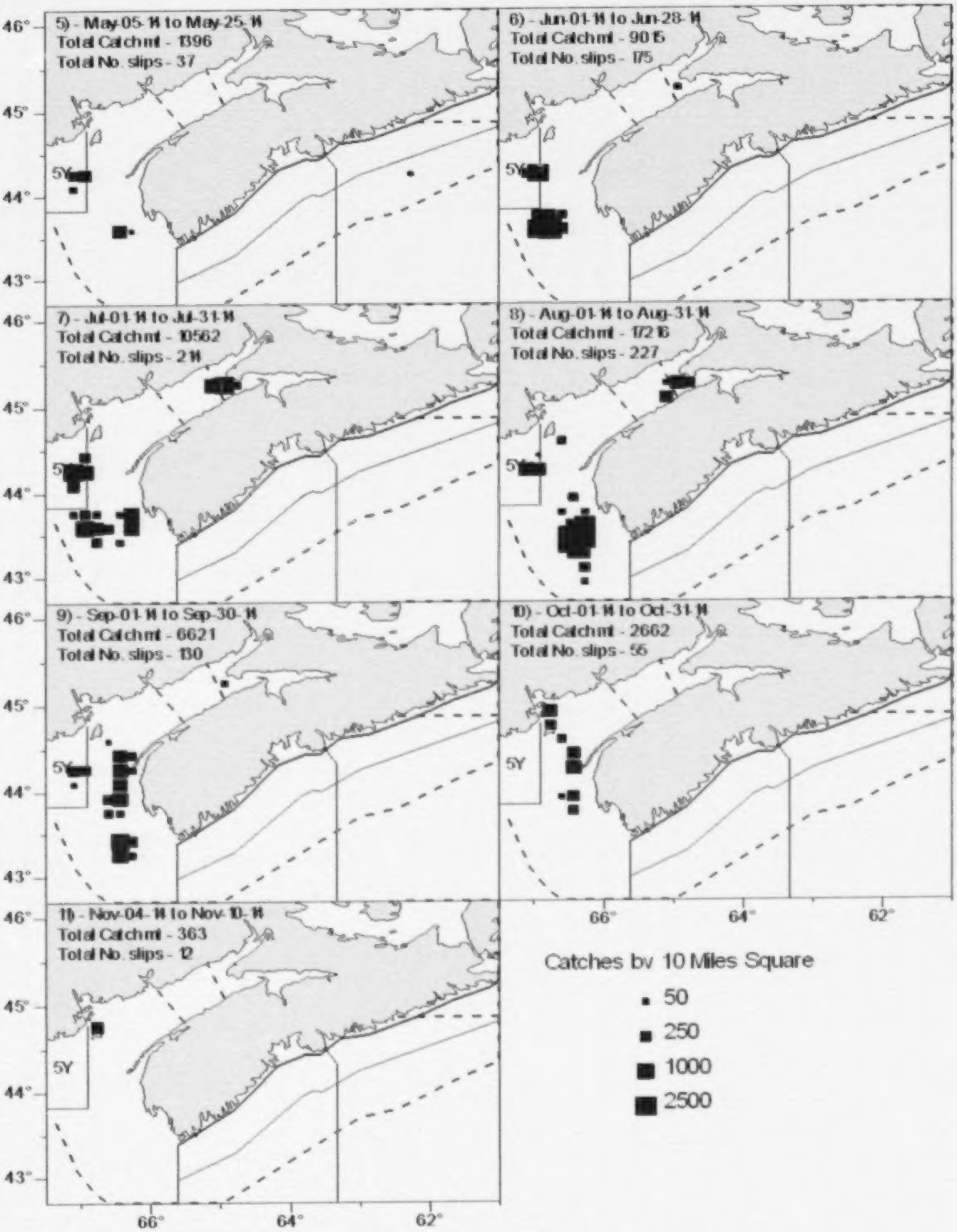

5) - May-05-14 to May-25-14
Total Catch mt - 1396
Total No. slips - 37
6) - Jun-01-14 to Jun-28-14
Total Catch mt - 9015
Total No. slips - 175
7) - Jul-01-14 to Jul-31-14
Total Catch mt - 10562
Total No. slips - 214
8) - Aug-01-14 to Aug-31-14
Total Catch mt - 17216
Total No. slips - 227
9) - Sep-01-14 to Sep-30-14
Total Catch mt - 6621
Total No. slips - 130
10) - Oct-01-14 to Oct-31-14
Total Catch mt - 2662
Total No. slips - 55
11) - Nov-04-14 to Nov-10-14
Total Catch mt - 363
Total No. slips - 12
5Y
46°
45°
44°
43°
66°
64°
62°
Catches by 10 Miles Square
50
250
1000
2500

Figure 10B. 2014 herring purse seine landings (t) by month in NAFO Divisions 4WX for calendar year 2014 (from Statistics Division MARFIS database).

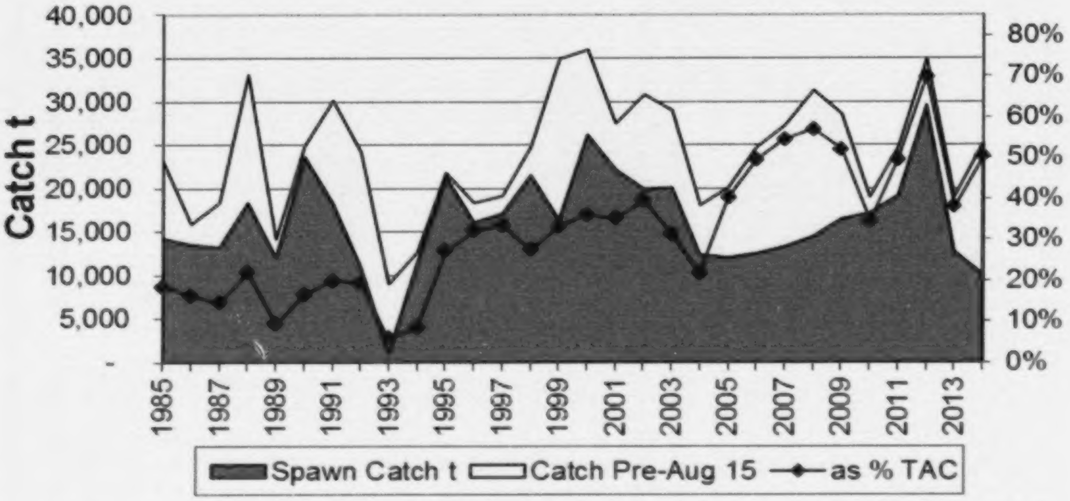


Figure 11. Annual herring purse seine landings (t) for the German Bank area from 1985-2014 with pre-spawning and spawning period landings based on an August 15 start date for the defined spawning period and overall German Bank landings as a proportion of the TAC.

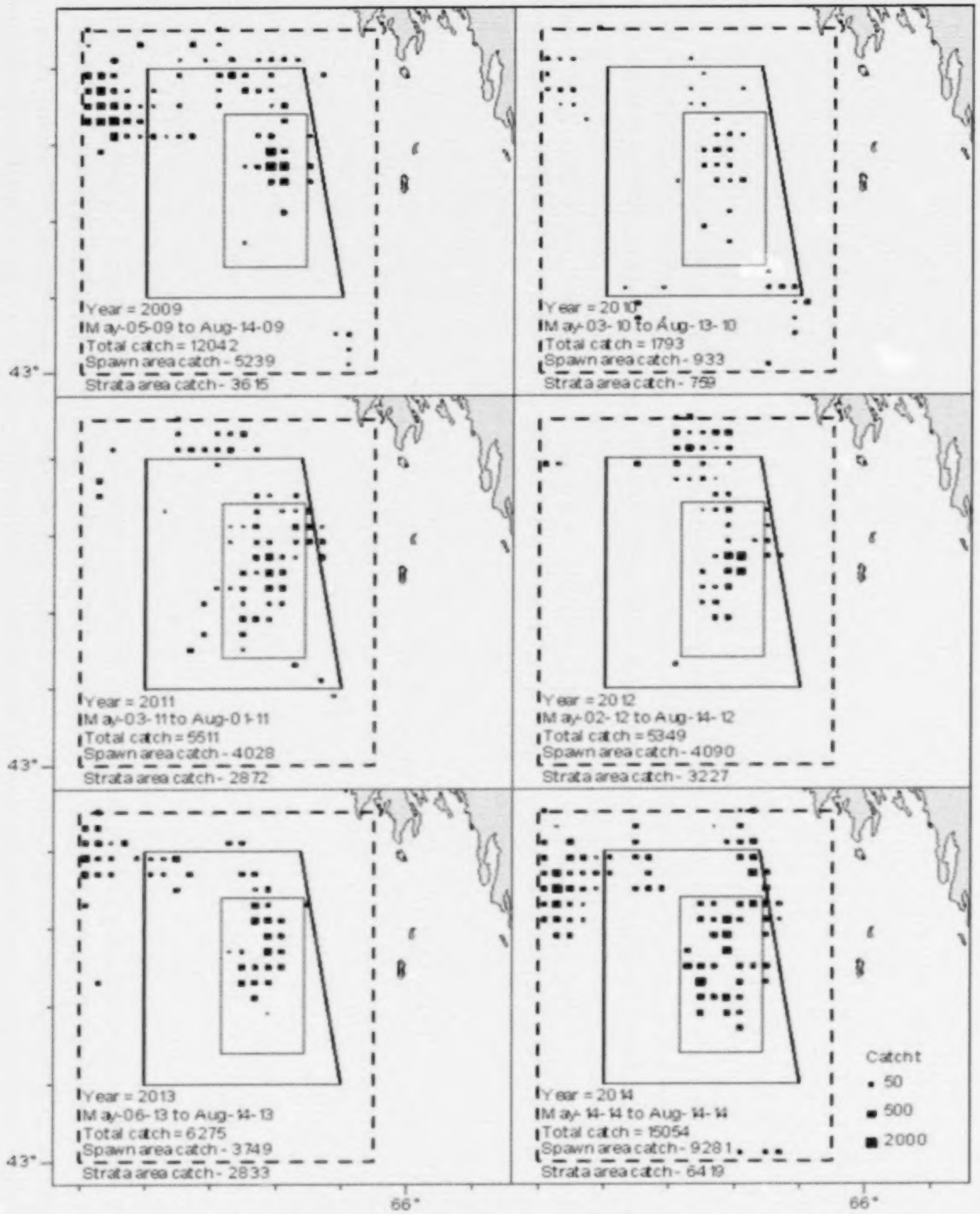
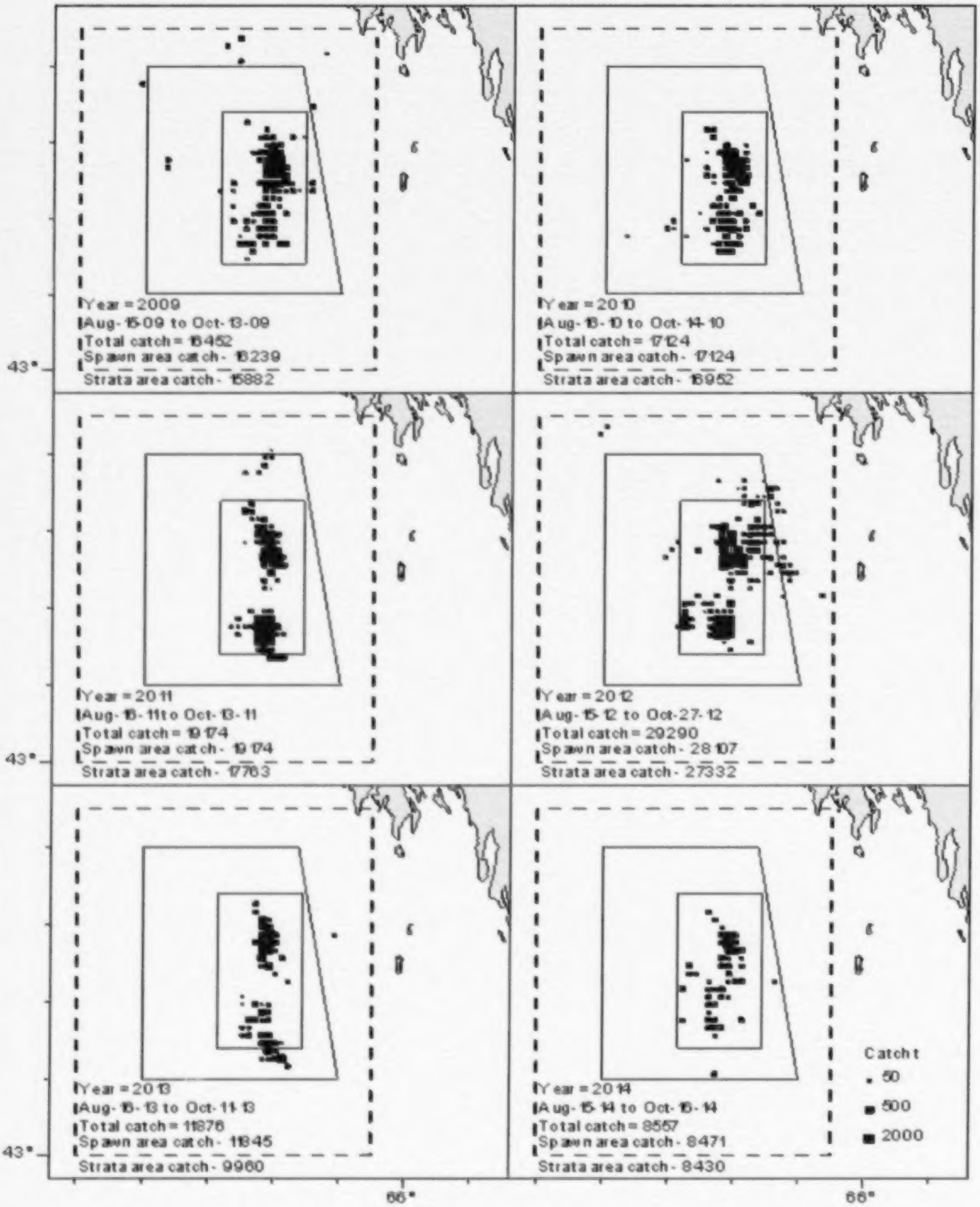

Year = 2009
May-05-09 to Aug-14-09
Total catch = 12042
Spawn area catch - 5239
Strata area catch - 3615
Year = 2010
May-03-10 to Aug-13-10
Total catch = 1793
Spawn area catch - 933
Strata area catch - 759
Year = 2011
May-03-11 to Aug-01-11
Total catch = 5511
Spawn area catch - 4028
Strata area catch - 2872
Year = 2012
May-02-12 to Aug-14-12
Total catch = 5349
Spawn area catch - 4090
Strata area catch - 3227
Year = 2013
May-06-13 to Aug-14-13
Total catch = 6275
Spawn area catch - 3749
Strata area catch - 2833
Year = 2014
May-14-14 to Aug-14-14
Total catch = 15054
Spawn area catch - 9281
Strata area catch - 6419
Catch t
50
500
2000
43°
43°
43°
66°
66°

Figure 12. Herring purse seine pre-spawning period landings (t) (January 1 to August 14) for German Bank from 2009-2014 with landed totals for the overall catch area, the middle 'Spawn Box' and the inner 'Strata Box', which was used as the primary search area in acoustic surveys.



Year = 2009
Aug-15-09 to Oct-13-09
Total catch = 16452
Spawn area catch - 16239
Strata area catch - 15882
Year = 2010
Aug-16-10 to Oct-14-10
Total catch = 17124
Spawn area catch - 17124
Strata area catch - 16952
Year = 2011
Aug-16-11 to Oct-13-11
Total catch = 19174
Spawn area catch - 19174
Strata area catch - 17763
Year = 2012
Aug-15-12 to Oct-27-12
Total catch = 29290
Spawn area catch - 28107
Strata area catch - 27332
Year = 2013
Aug-16-13 to Oct-11-13
Total catch = 11876
Spawn area catch - 11845
Strata area catch - 9960
Year = 2014
Aug-15-14 to Oct-16-14
Total catch = 8557
Spawn area catch - 8471
Strata area catch - 8430
Catch t
50
500
2000
43°
43°
43°
66°
66°

Figure 13. Herring purse seine spawning period landings (t) (August 15 to October 31) for German Bank from 2009-2014 with landed totals for the overall catch area, the middle 'Spawn Box' and the inner 'Strata Box', which was used as the primary search area in acoustic surveys.

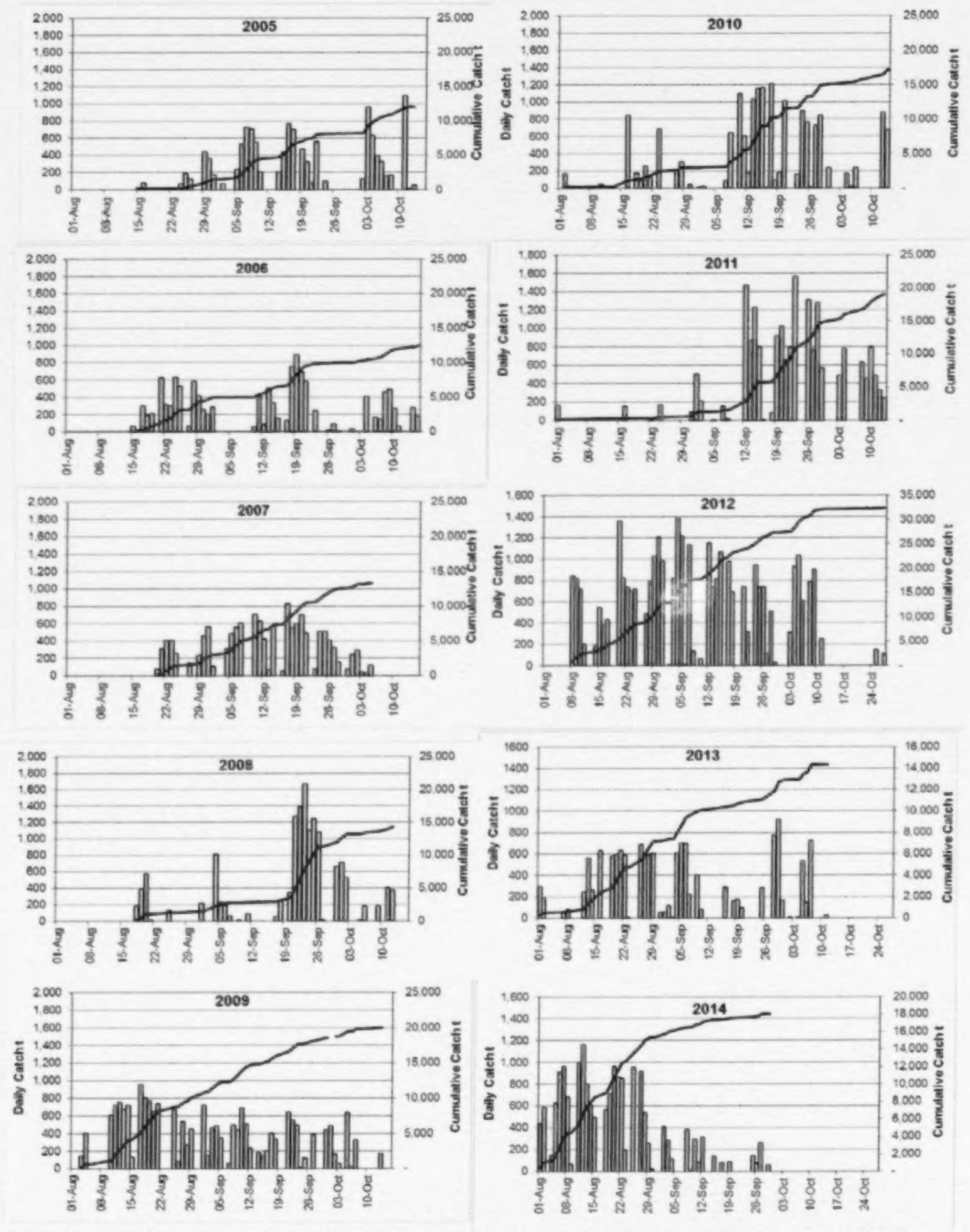


Figure 14. The 2005 to 2014 daily purse seine herring landings (t) [bars] for German Bank with the cumulative total landed [solid line] over the defined spawning season from August 15 to October 30 (note years after 2014 include landings from August 1 to August 14).

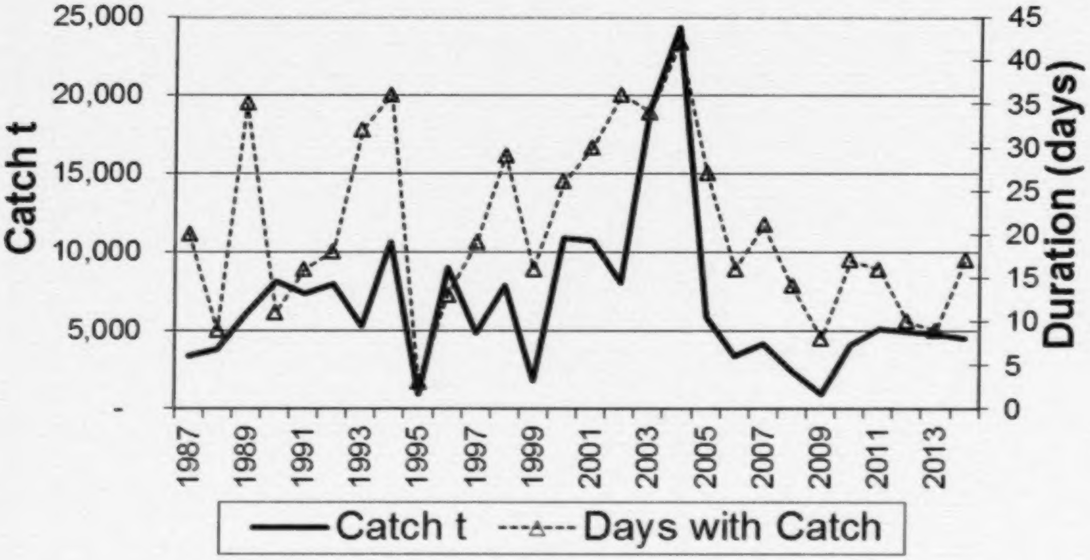
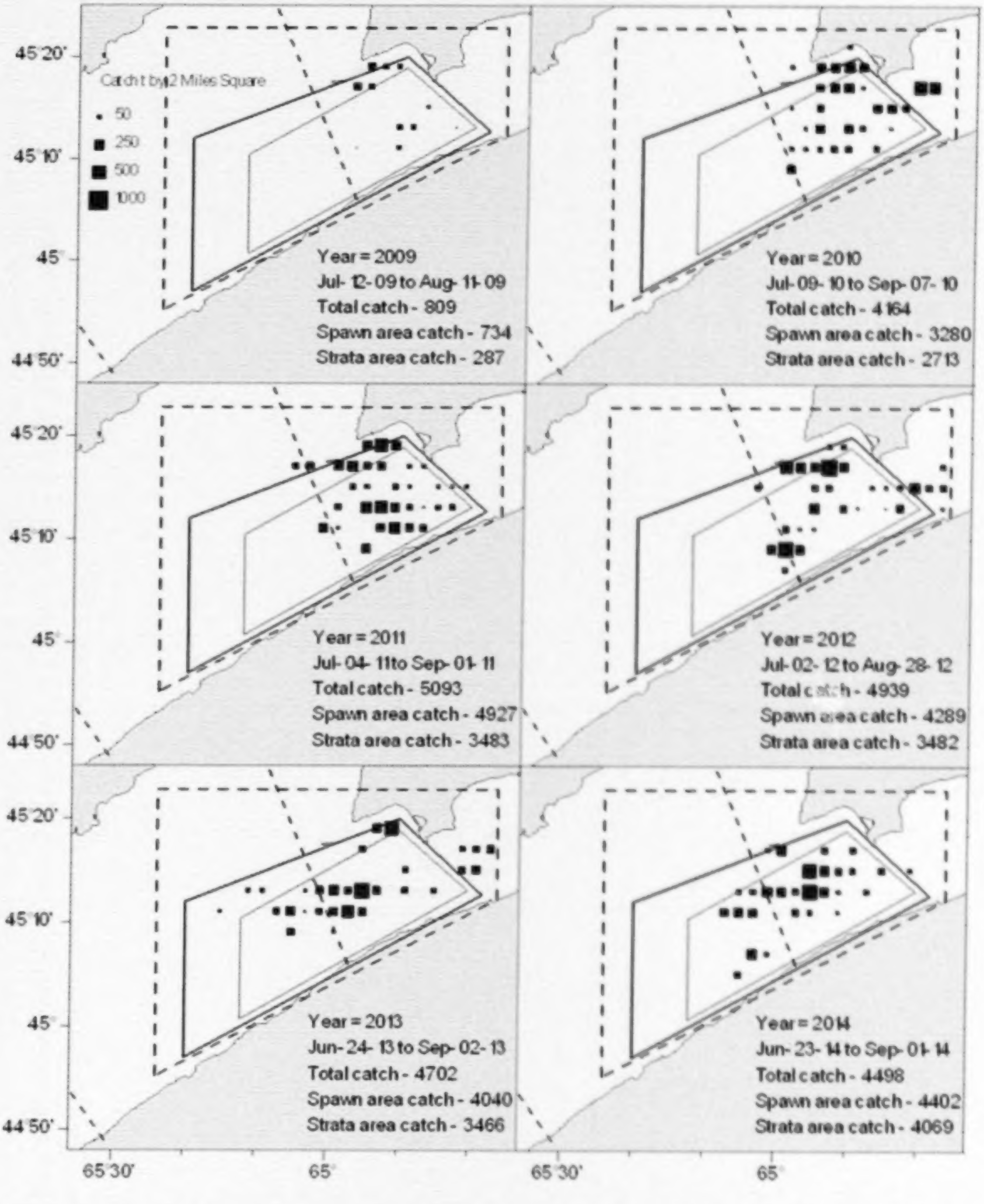


Figure 15. Annual herring purse seine landings (t) for the Scots Bay area from 1987-2014 with duration of fishery in days (start date to end date).



Catch t by 2 Miles Square
50
250
500
1000
45°20'
45°10'
45°
44°50'
65°30'
65°
Year = 2009
Jul- 12- 09 to Aug- 11- 09
Total catch - 809
Spawn area catch - 734
Strata area catch - 287
Year = 2010
Jul- 09- 10 to Sep- 07- 10
Total catch - 4164
Spawn area catch - 3280
Strata area catch - 2713
Year = 2011
Jul- 04- 11to Sep- 01- 11
Total catch - 5093
Spawn area catch - 4927
Strata area catch - 3483
Year = 2012
Jul- 02- 12 to Aug- 28- 12
Total catch - 4939
Spawn area catch - 4289
Strata area catch - 3482
Year = 2013
Jun- 24- 13 to Sep- 02- 13
Total catch - 4702
Spawn area catch - 4040
Strata area catch - 3466
Year = 2014
Jun- 23- 14 to Sep- 01- 14
Total catch - 4498
Spawn area catch - 4402
Strata area catch - 4069

Figure 16. Herring purse seine landings (t) for the Scots Bay area from 2009-2014 with landed totals (t) for the overall area, the middle 'Spawning' area, and the inner 'Strata' area, which is used as the primary search area in acoustic surveys.

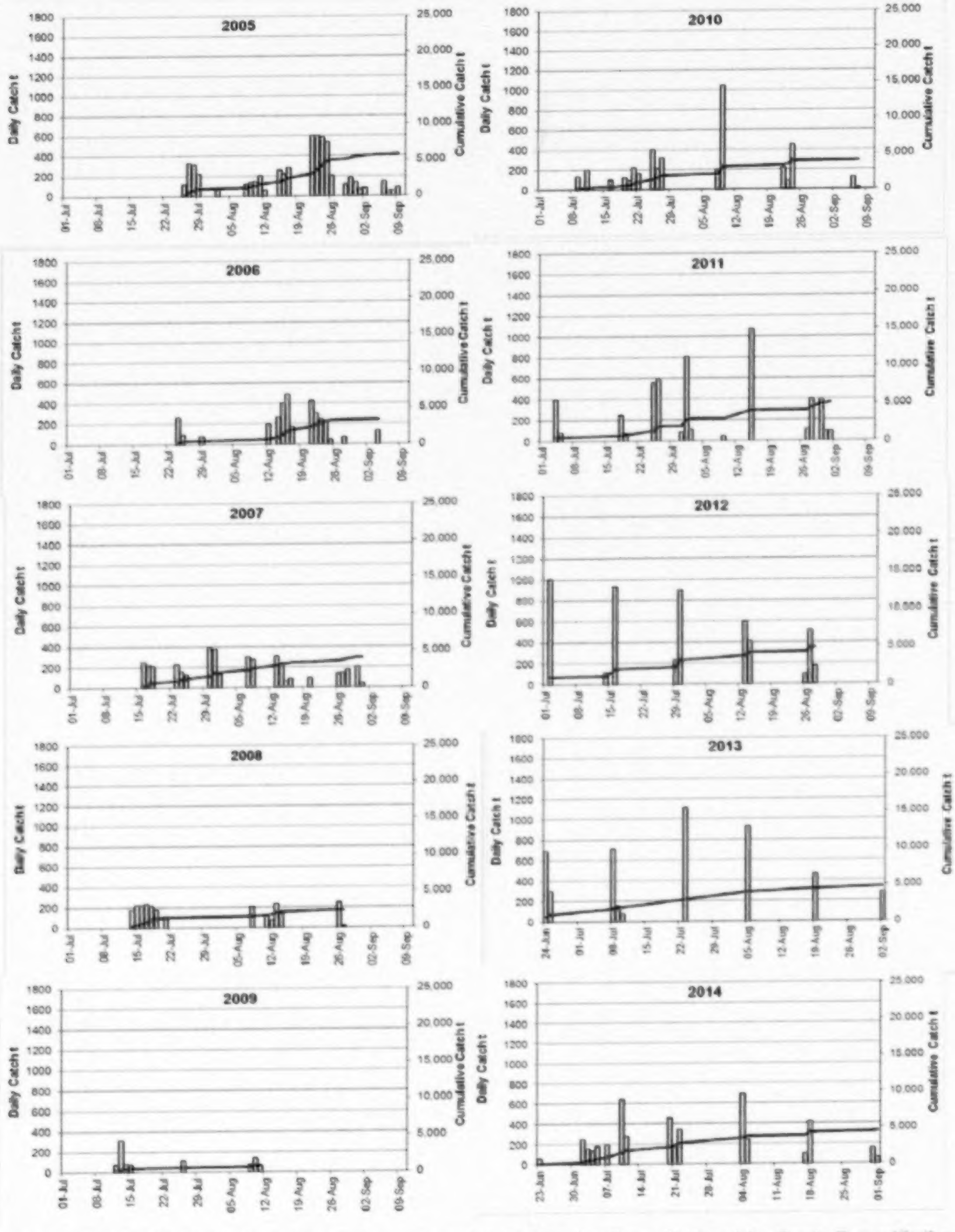


Figure 17. The 2005-2014 Scots Bay daily purse seine herring landings (t) [bars] for Scots Bay with the cumulative total landed (t) [solid line] over the entire fishing season.

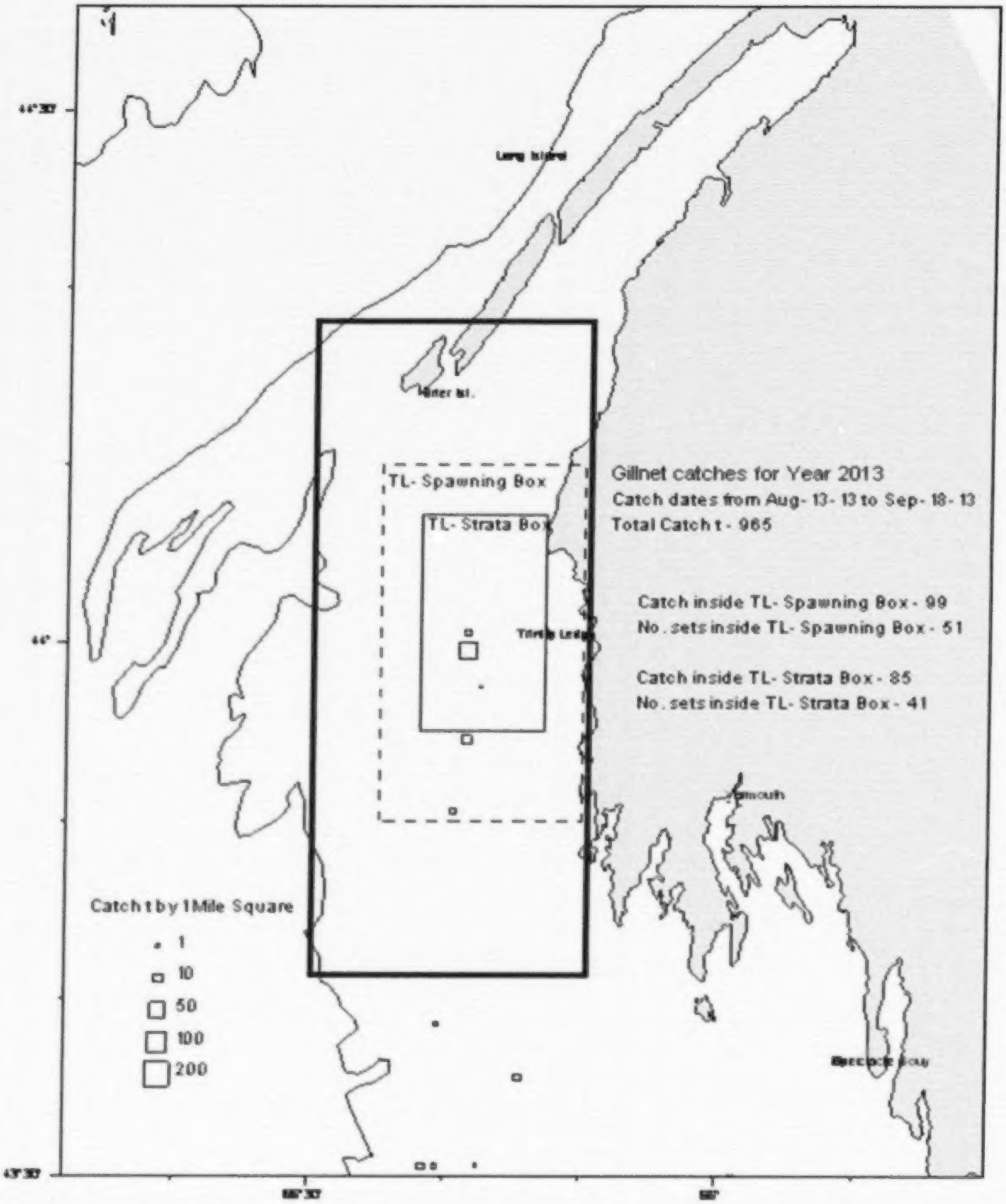

Gillnet catches for Year 2013
Catch dates from Aug-13-13 to Sep-18-13
Total Catch t - 965
Catch inside TL-Spawning Box - 99
No. sets inside TL-Spawning Box - 51
Catch inside TL-Strata Box - 85
No. sets inside TL-Strata Box - 41
TL-Spawning Box
TL-Strata Box
Long Island
Trinity Ledge
Catch t by 1Mile Square
1
10
50
100
200
44°30'
44°
43°30'
66°30'
66°

Figure 18A. The 2013 Trinity Ledge herring gillnet landings (t) in the survey strata box and spawning area box areas.

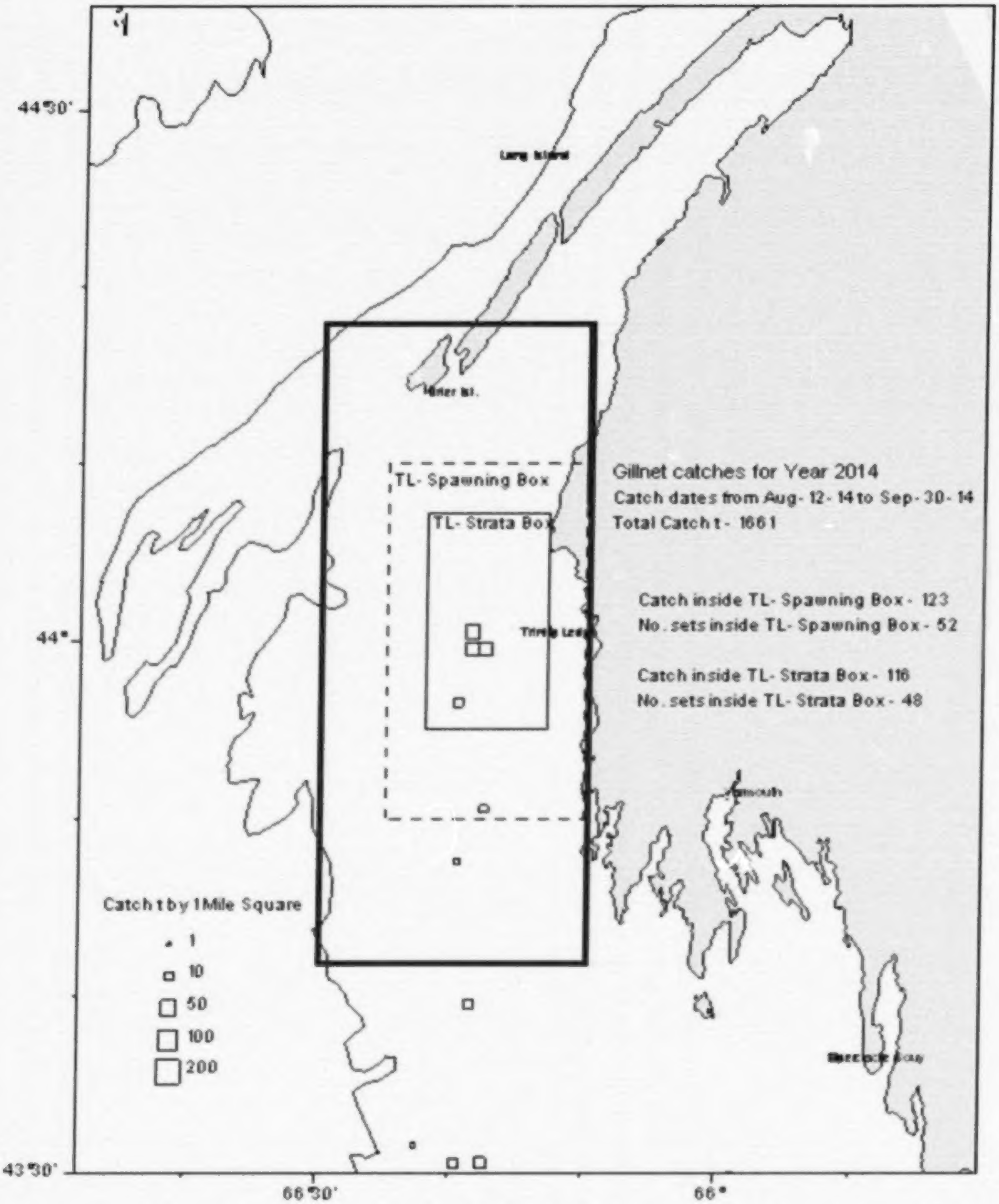

44°30'
44°
43°30'
66°30'
66°
Long Island
Brier Isl.
Trinity Ledge
Yarmouth
TL- Spawning Box
TL- Strata Box
Gillnet catches for Year 2014
Catch dates from Aug- 12- 14 to Sep- 30- 14
Total Catch t - 1661
Catch inside TL- Spawning Box - 123
No. sets inside TL- Spawning Box - 52
Catch inside TL- Strata Box - 116
No. sets inside TL- Strata Box - 48
Catch t by 1 Mile Square
1
10
50
100
200

Figure 18B. The 2014 Trinity Ledge herring gillnet landings (t) in the survey strata box and spawning area box areas.

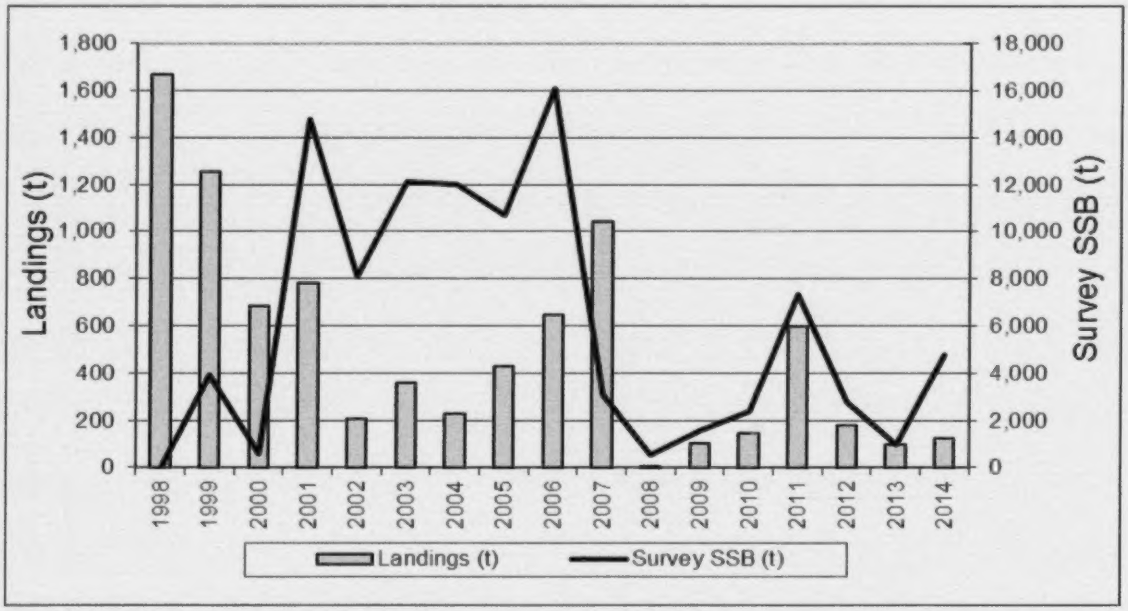


Figure 19. Trinity Ledge herring landings (t) and acoustic survey biomass (t) estimates from 1998-2014. All acoustic estimates prior to 2003 were calculated without the CIF. Note: Landings scale is 10% of that of survey biomass.

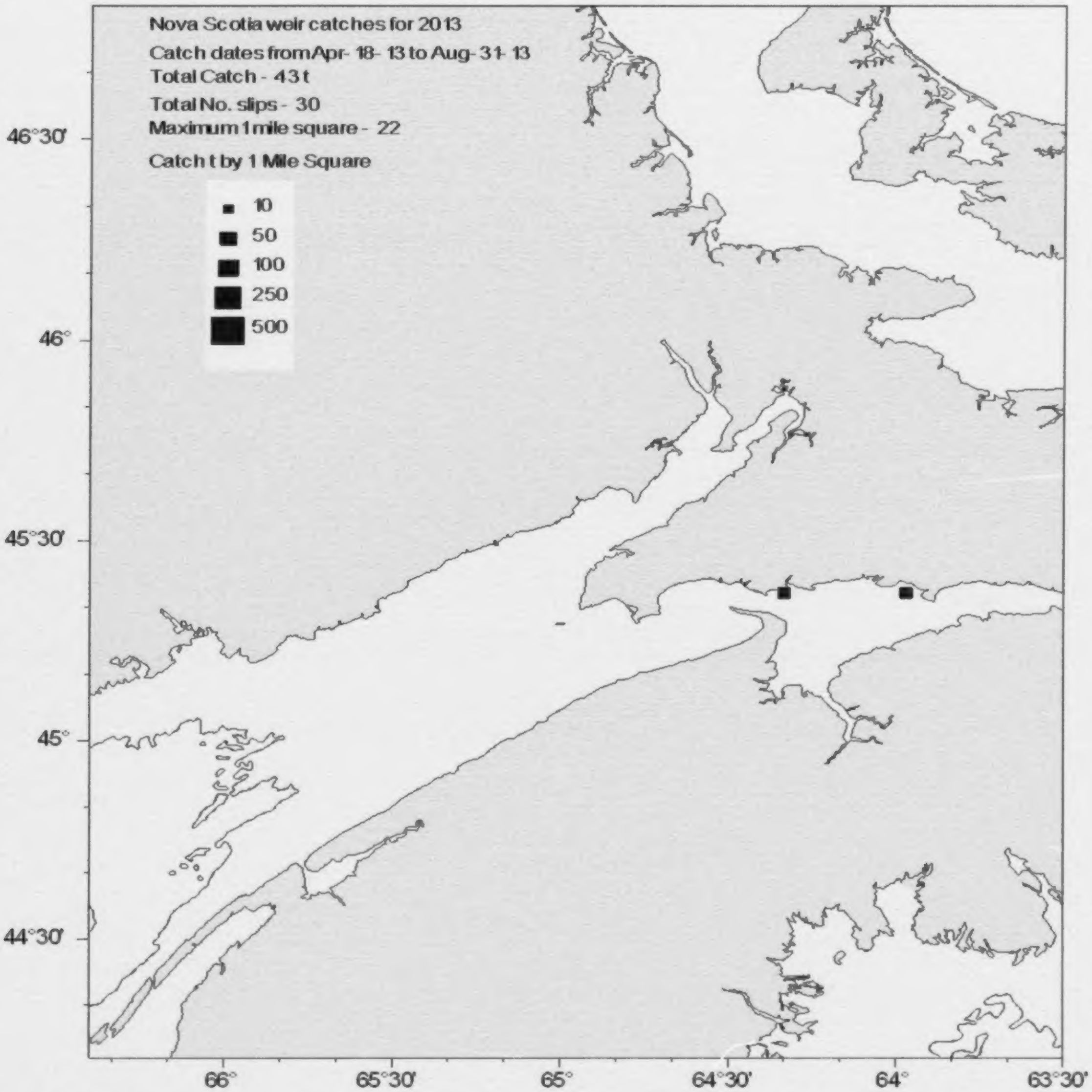

Nova Scotia weir catches for 2013
Catch dates from Apr- 18- 13 to Aug- 31- 13
Total Catch - 43 t
Total No. slips - 30
Maximum 1 mile square - 22
Catch t by 1 Mile Square
10
50
100
250
500
46°30'
46°
45°30'
45°
44°30'
66°
65°30'
65°
64°30'
64°
63°30'

Figure 20A. Nova Scotia herring weir landings (t) by location for the 2013 calendar year.

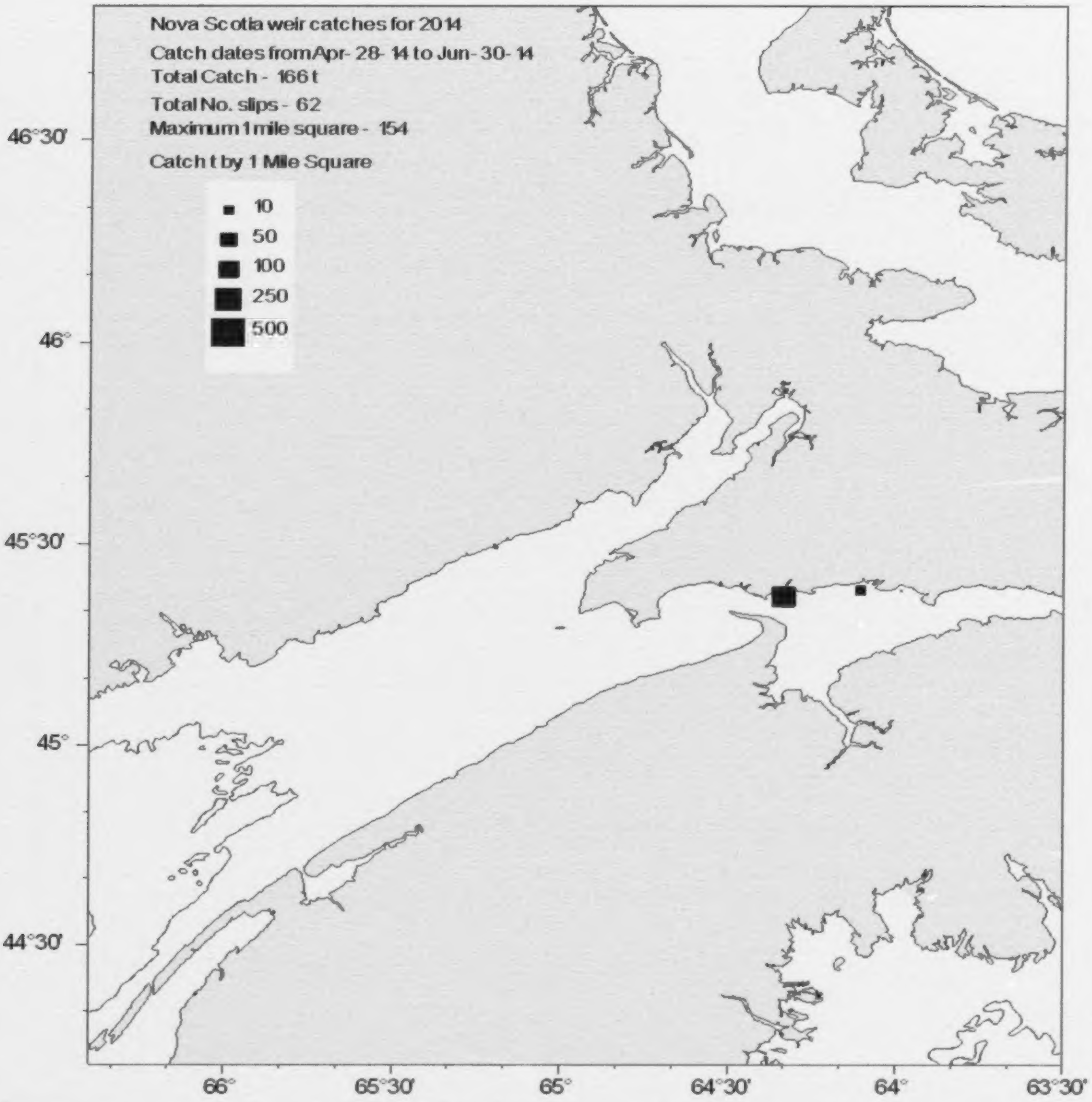

Nova Scotia weir catches for 2014
Catch dates from Apr- 28- 14 to Jun- 30- 14
Total Catch - 166 t
Total No. slips - 62
Maximum 1 mile square - 154
Catch t by 1 Mile Square
10
50
100
250
500
46°30'
46°
45°30'
45°
44°30'
66°
65°30'
65°
64°30'
64°
63°30'

Figure 20B. Nova Scotia herring weir landings (t) by location for the 2014 calendar year.

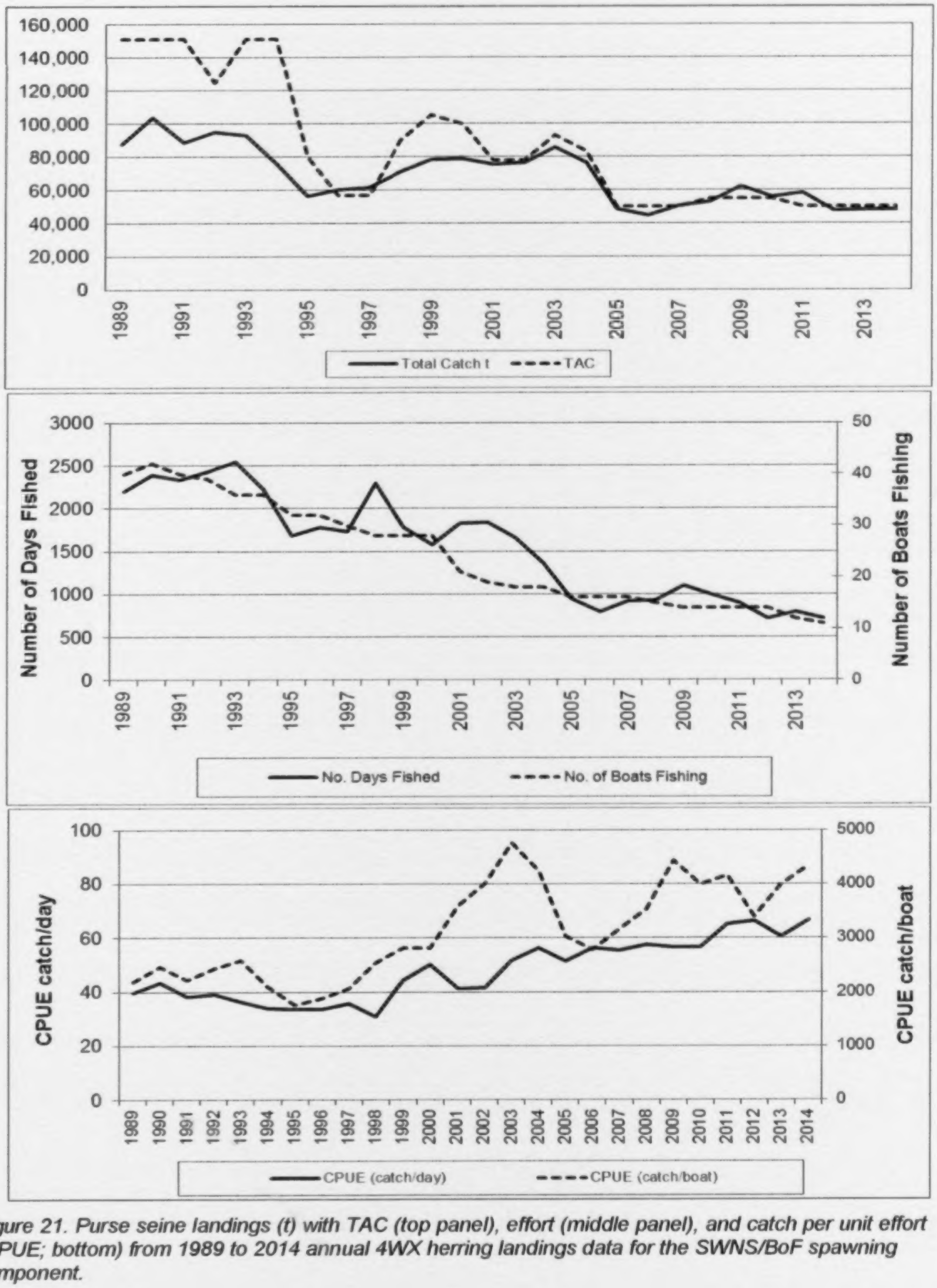


Figure 21. Purse seine landings (t) with TAC (top panel), effort (middle panel), and catch per unit effort (CPUE; bottom) from 1989 to 2014 annual 4WX herring landings data for the SWNS/BoF spawning component.

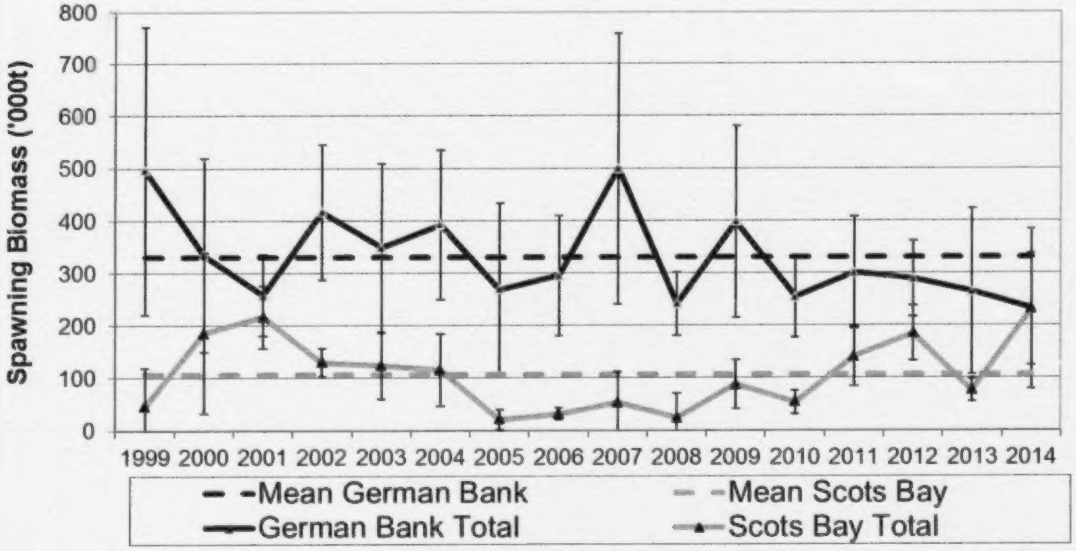


Figure 22. SSB index ('000t) from acoustic surveys for the SWNS/BoF spawning component for the German Bank and Scots Bay areas along with the respective averages from 1999-2014 with 95% confidence intervals (equivalent to two times SE).

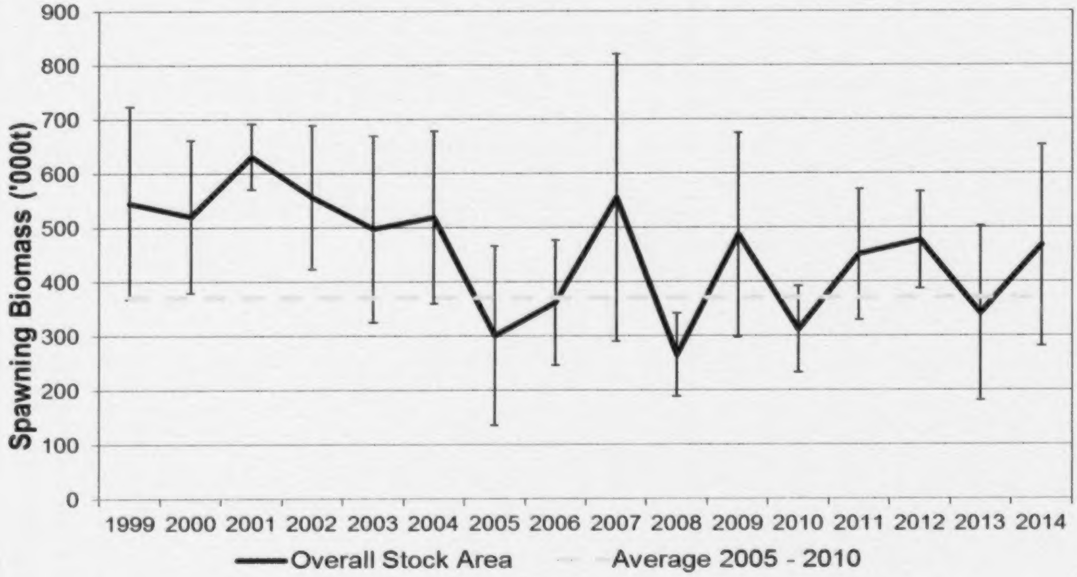


Figure 23. Herring SSB ('000t) from acoustic surveys for the combined SWNS/BoF spawning component (along with the average from 2005-2010) with 95% confidence intervals (equivalent to two times SE).

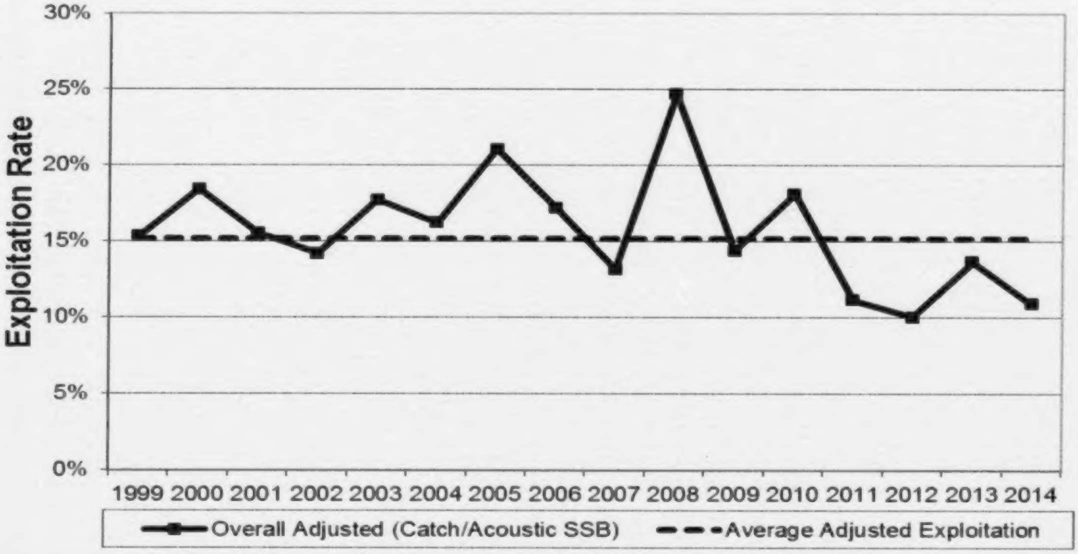


Figure 24. Relative exploitation rate (%) for the SWNS/BoF spawning component using overall landings as a proportion of the overall acoustic SSB.

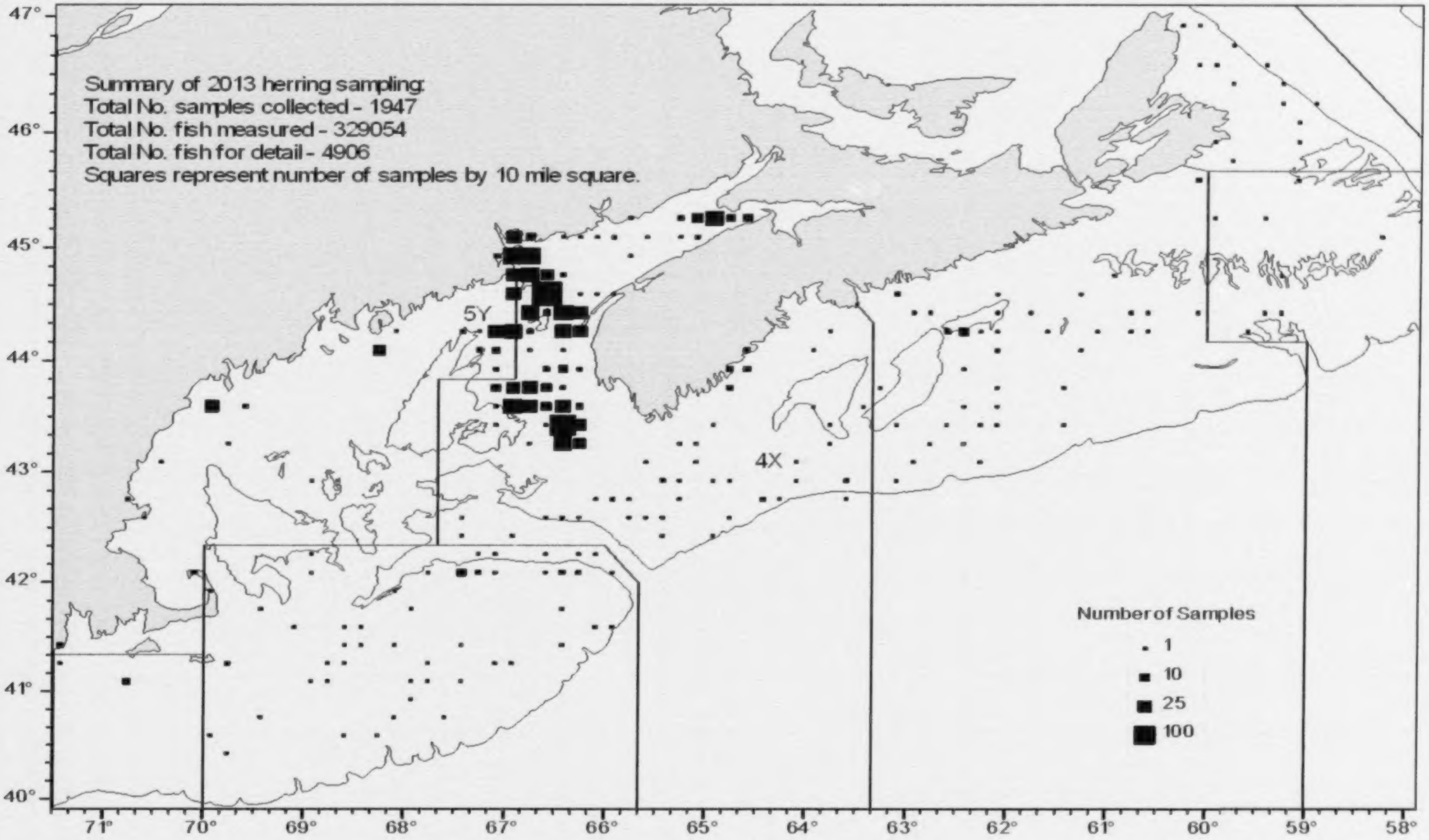
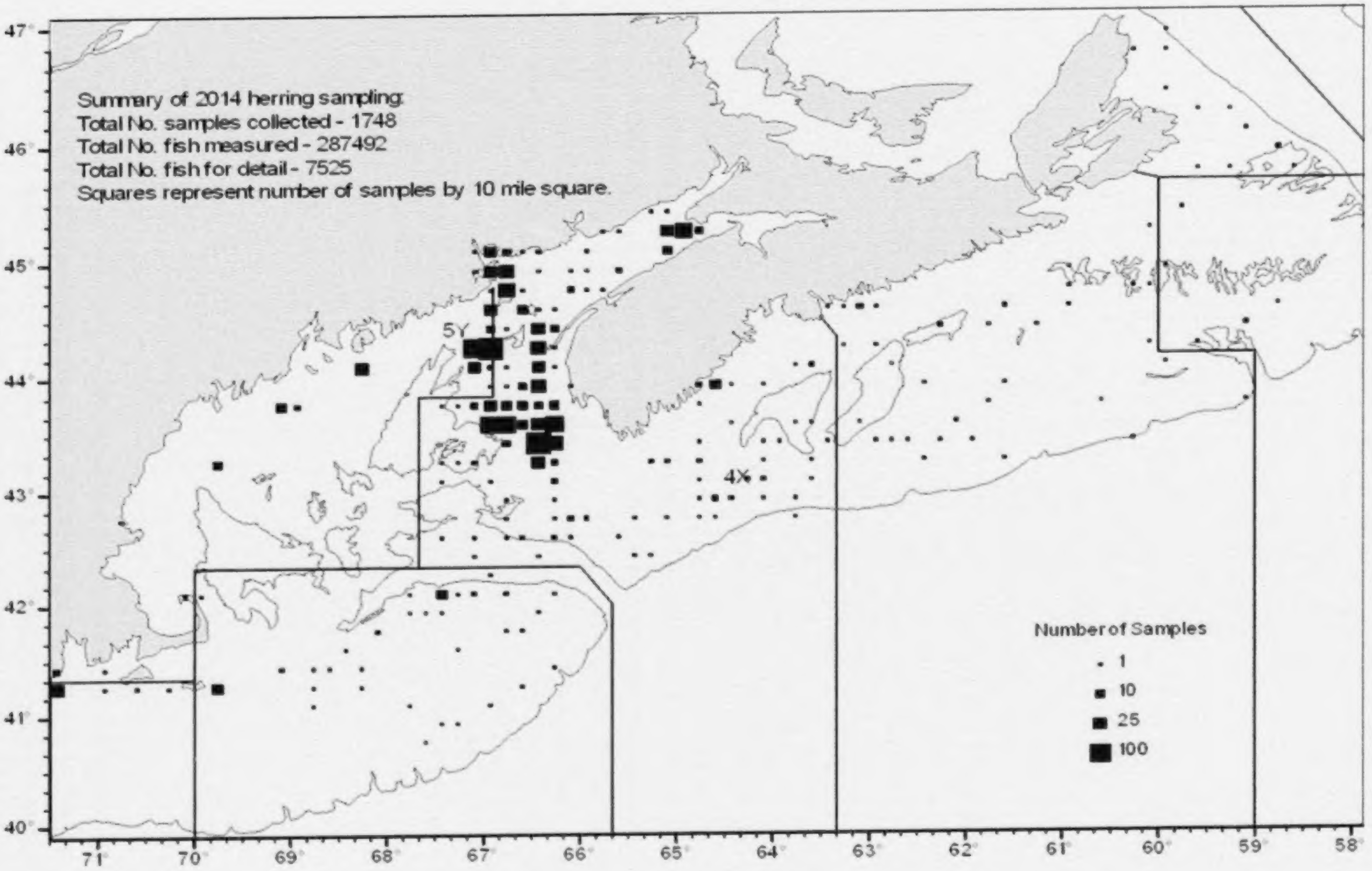

Summary of 2013 herring sampling:
Total No. samples collected - 1947
Total No. fish measured - 329054
Total No. fish for detail - 4906
Squares represent number of samples by 10 mile square.
5Y
4X
Number of Samples
1
10
25
100
47°
46°
45°
44°
43°
42°
41°
40°
71°
70°
69°
68°
67°
66°
65°
64°
63°
62°
61°
60°
59°
58°

Figure 25A. 2013 herring sampling coverage by location from all sources (numbers of length frequency samples grouped by 10-mile squares).


Summary of 2014 herring sampling:
Total No. samples collected - 1748
Total No. fish measured - 287492
Total No. fish for detail - 7525
Squares represent number of samples by 10 mile square.

47°
46°
45°
44°
43°
42°
41°
40°
71°
70°
69°
68°
67°
66°
65°
64°
63°
62°
61°
60°
59°
58°
5Y
4X
Number of Samples
1
10
25
100

Figure 25B. 2014 herring sampling coverage by location from all sources (numbers of length frequency samples grouped by 10-mile squares).

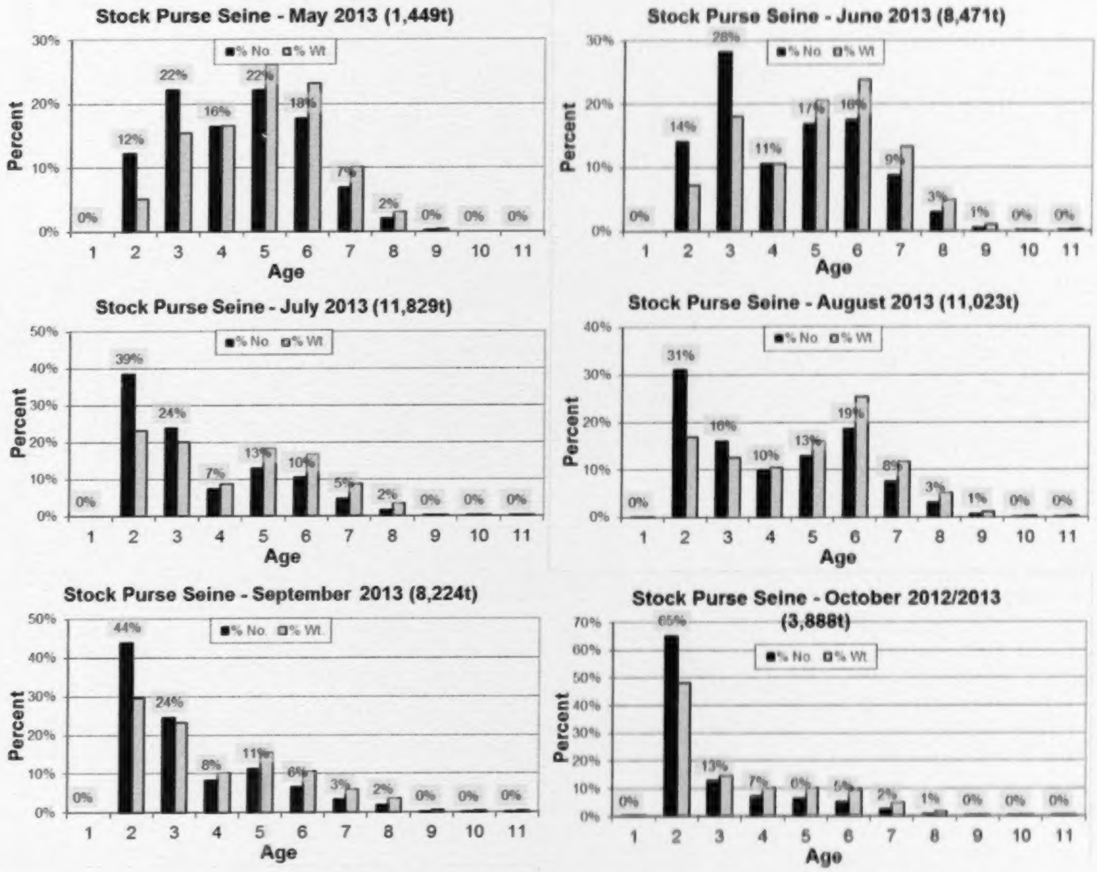


Figure 26A. Fishery catch at age by month (% numbers and % weight) from the 2013 SWNS/BoF summer purse seine fishery.

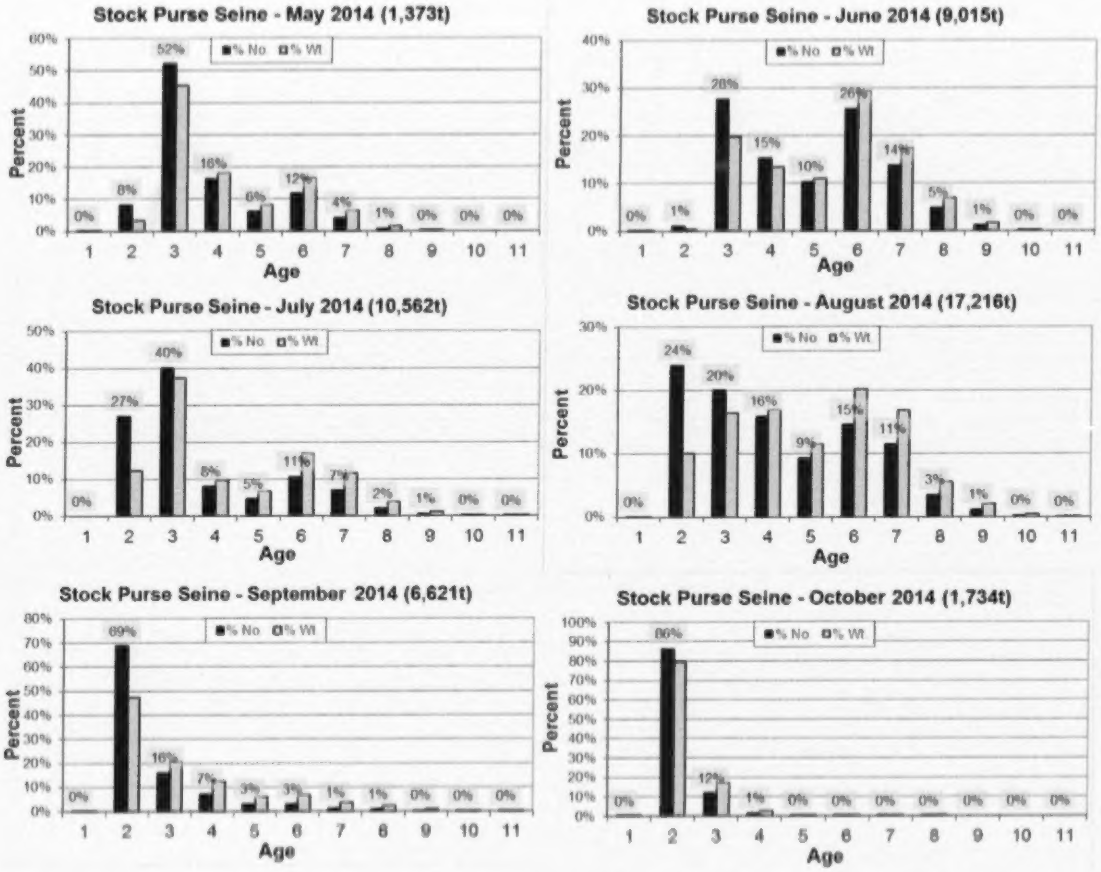


Figure 26B. Fishery catch at age by month (% numbers and % weight) from the 2014 SWNS/BoF summer purse seine fishery.

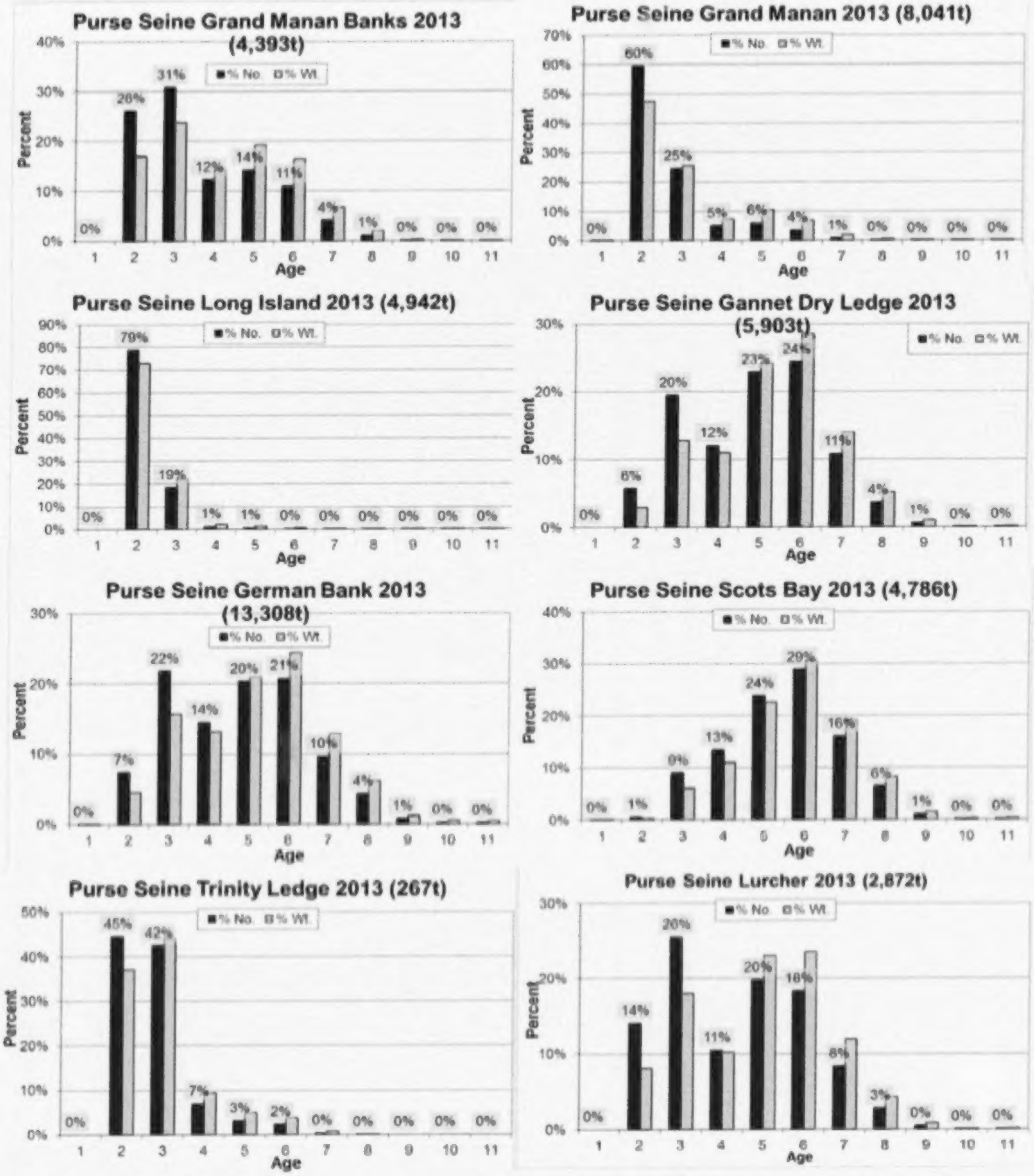


Figure 27A. Fishery catch at age by ground (% numbers and % weight) from the 2013 SWNS/BoF summer purse seine fishery.

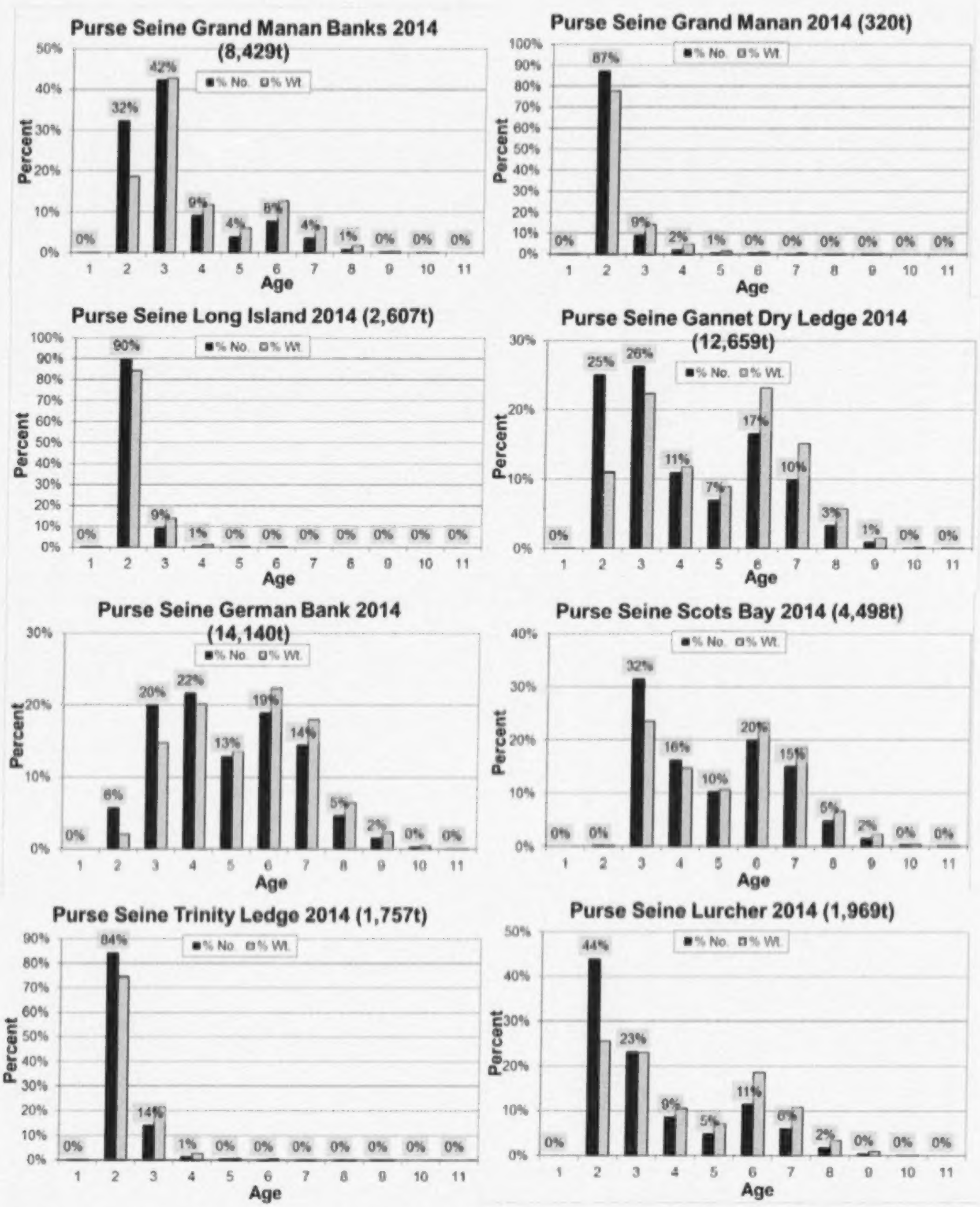
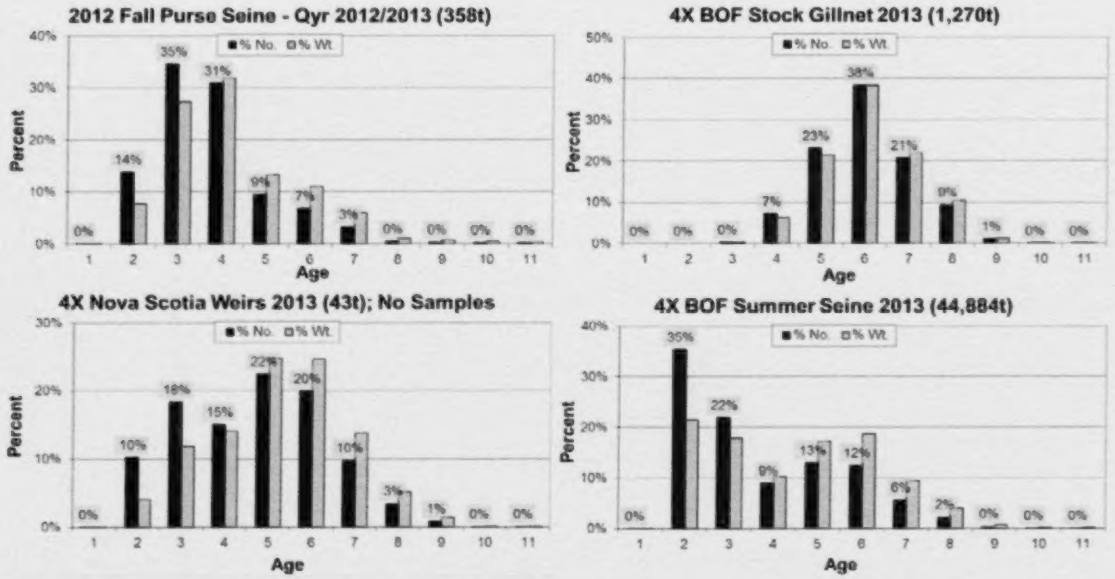


Figure 27B. Fishery catch at age by ground (% numbers and % weight) from the 2014 SWNS/BoF summer purse seine fishery.



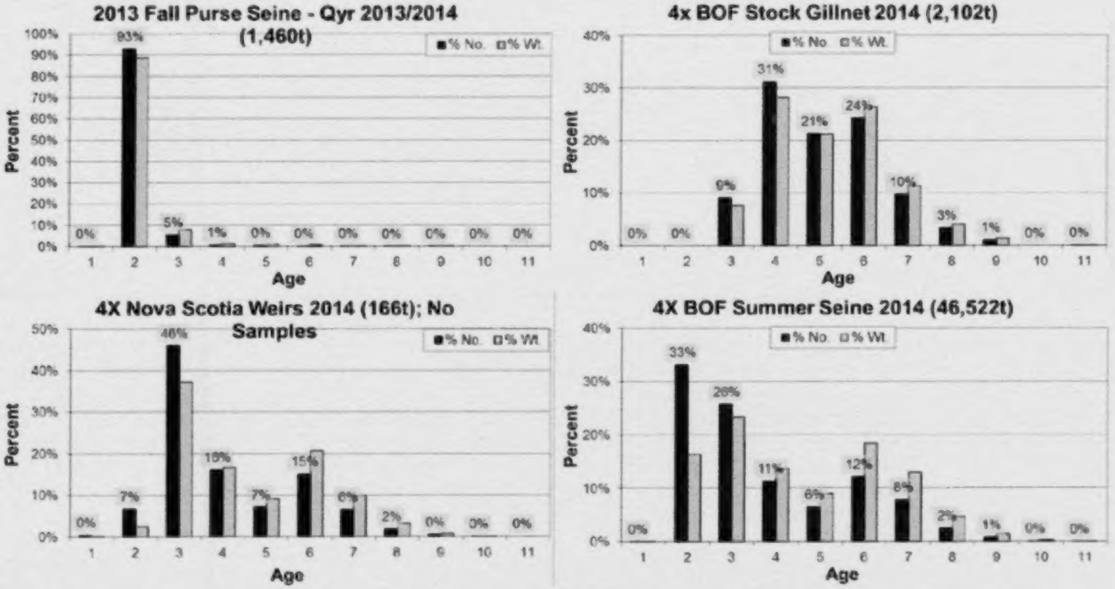
2012 Fall Purse Seine - Qyr 2012/2013 (358t)

4X BOF Stock Gillnet 2013 (1,270t)

4X Nova Scotia Weirs 2013 (43t); No Samples

4X BOF Summer Seine 2013 (44,884t)

Figure 28A. Fishery catch at age by gear component (% numbers and % weight) from the 2013 SWNS/BoF spawning component (Qyr = quota year).



2013 Fall Purse Seine - Qyr 2013/2014 (1,460t)

4x BOF Stock Gillnet 2014 (2,102t)

4X Nova Scotia Weirs 2014 (166t); No Samples

4X BOF Summer Seine 2014 (46,522t)

Figure 28B. Fishery catch at age by gear component (% numbers and % weight) from the 2014 SWNS/BoF spawning component (Qyr = quota year).

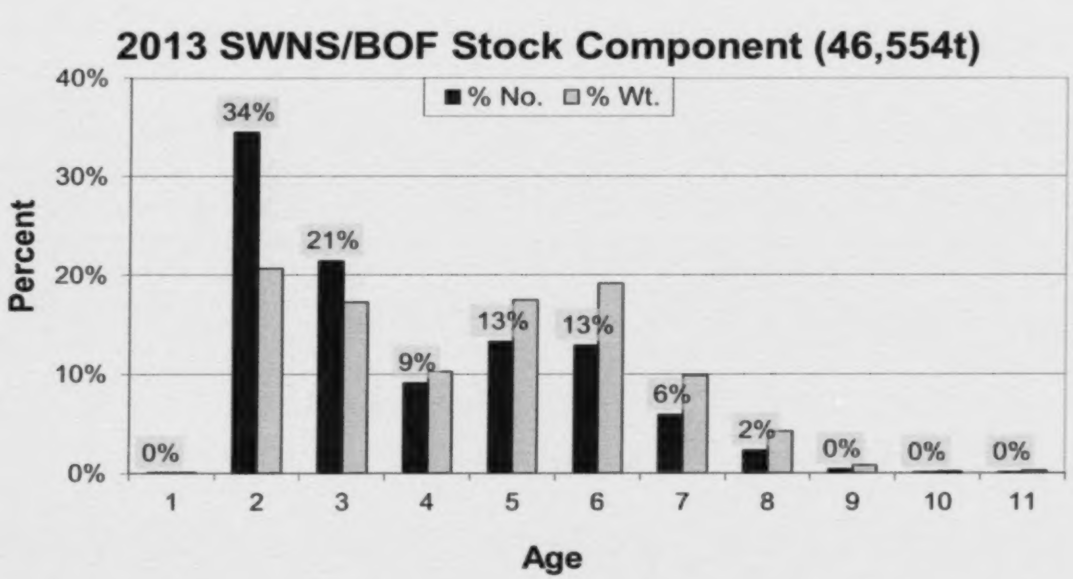


Figure 29A. Overall fishery catch at age (% numbers and % weight) from the 2013 SWNS/BoF spawning component.

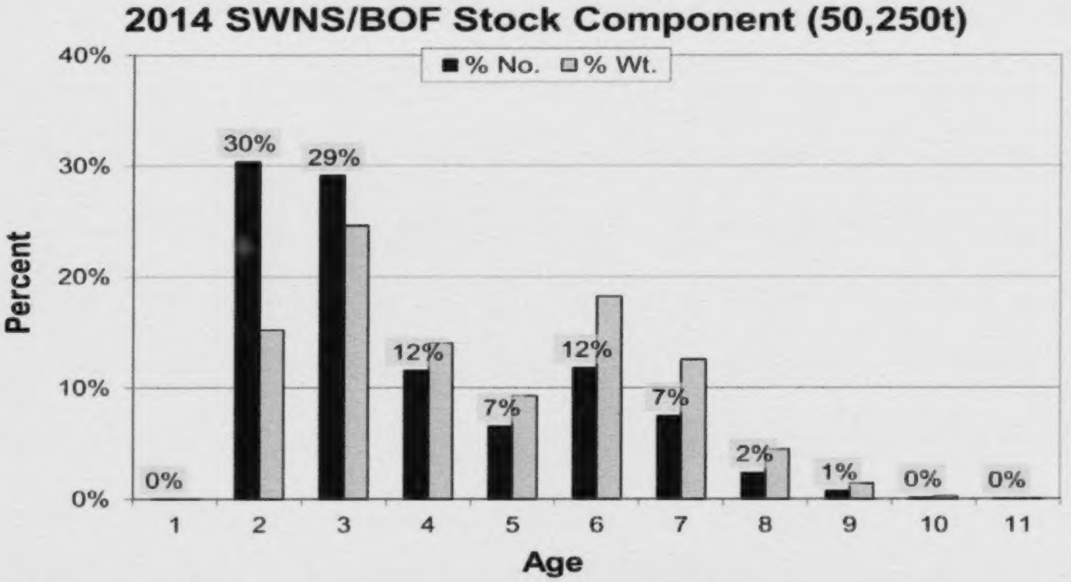


Figure 29B. Overall fishery catch at age (% numbers and % weight) from the 2014 SWNS/BoF spawning component.

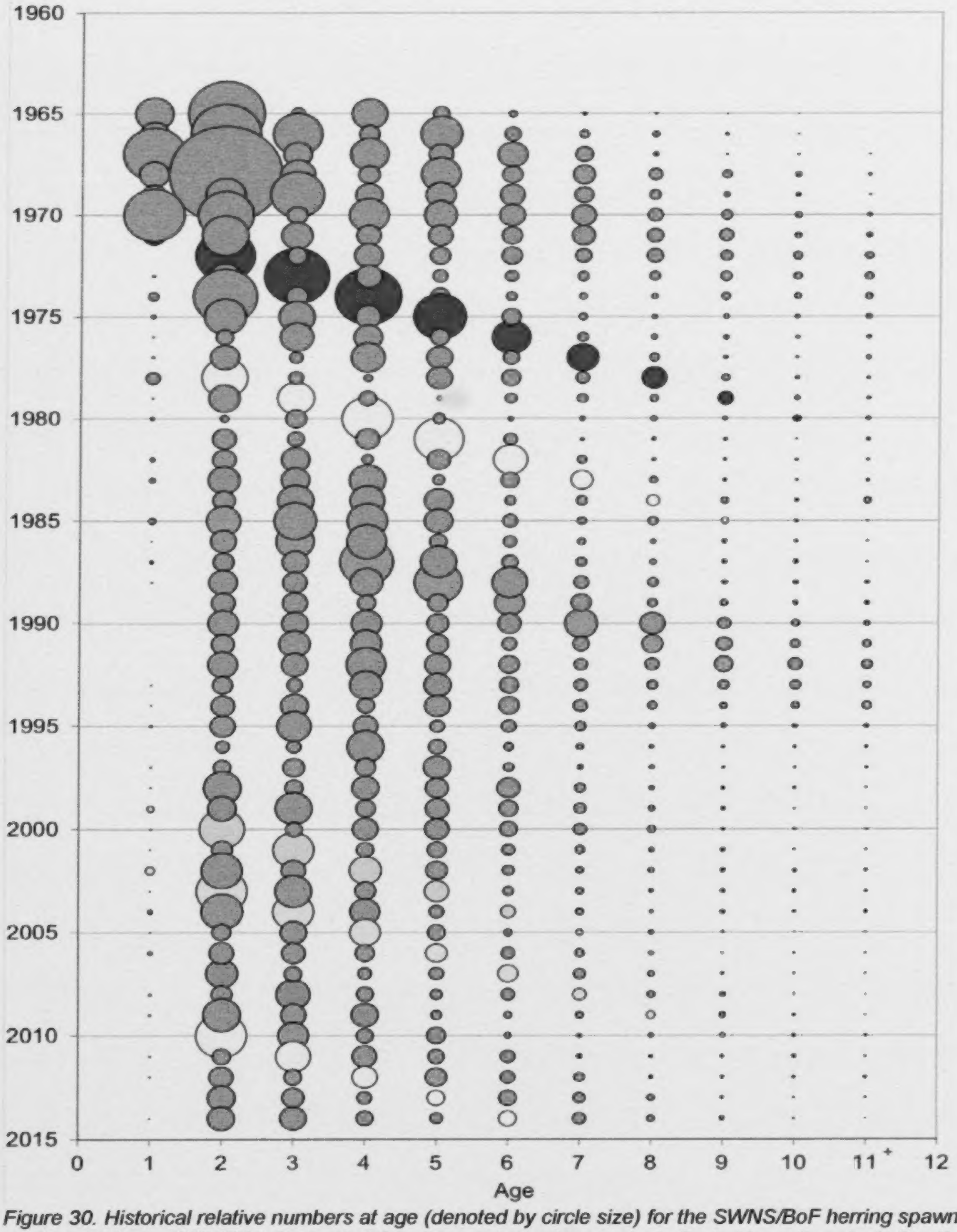


Figure 30. Historical relative numbers at age (denoted by circle size) for the SWNS/BoF herring spawning component from 1965-2014. Several of the stronger year-classes are indicated by colours including the 1970, 1978, 1983, 1998, 2001, 2005 and 2008 year-classes.

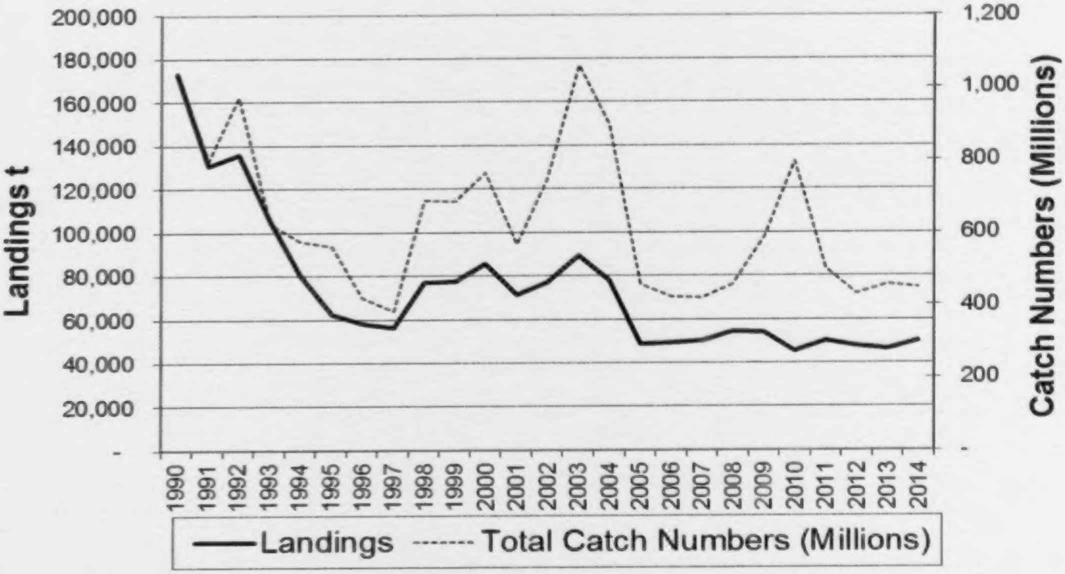


Figure 31. Total landings (t) and total removals (millions) for the combined annual landings from the SWNS spawning component for 1990 to 2014.

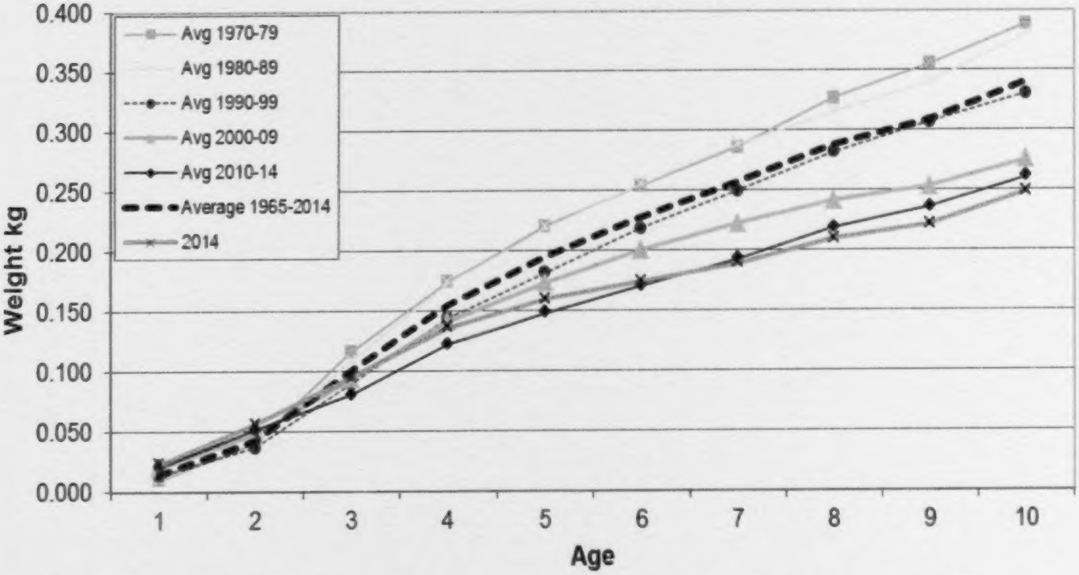
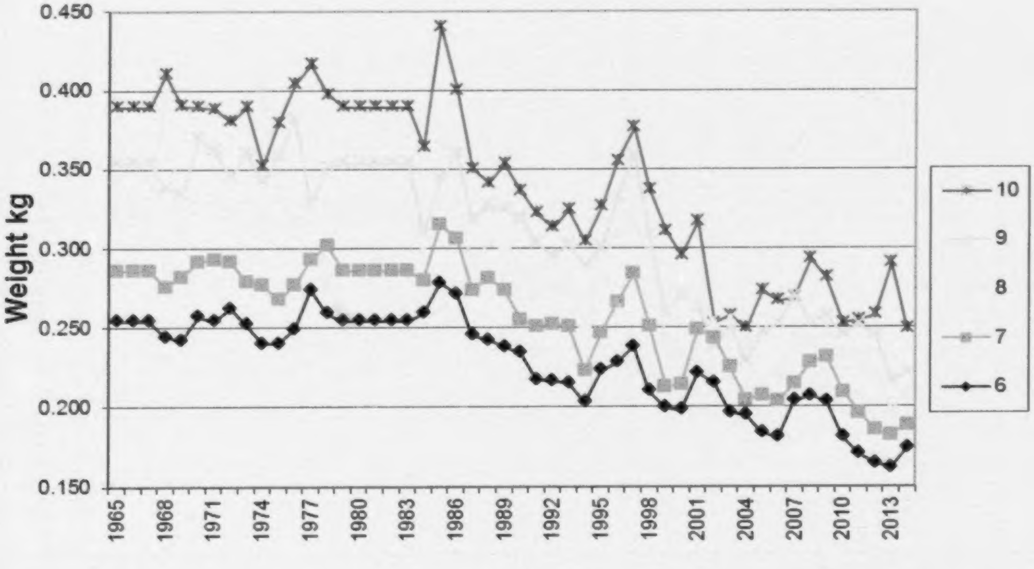


Figure 32. Average weights at age (kg) for the SWNS/BoF component of the 4WX herring fishery (fishery weighted) for the most recent year, by decade and the long term for the historical series.



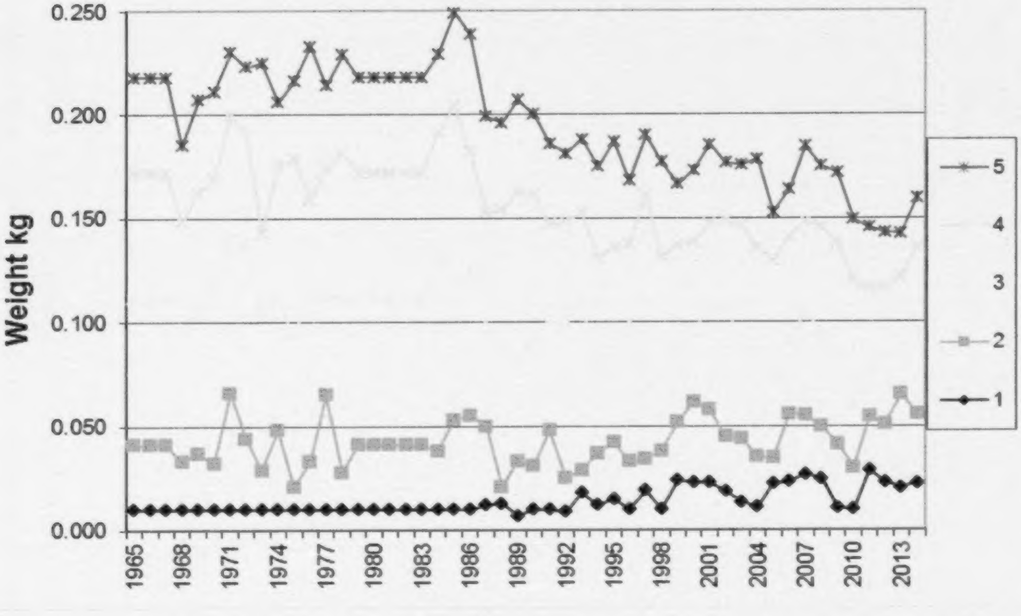


Figure 33. Average weights at age (kg) for the SWNS/BoF component of the 4WX herring fishery (fishery weighted) for 1965-2014.

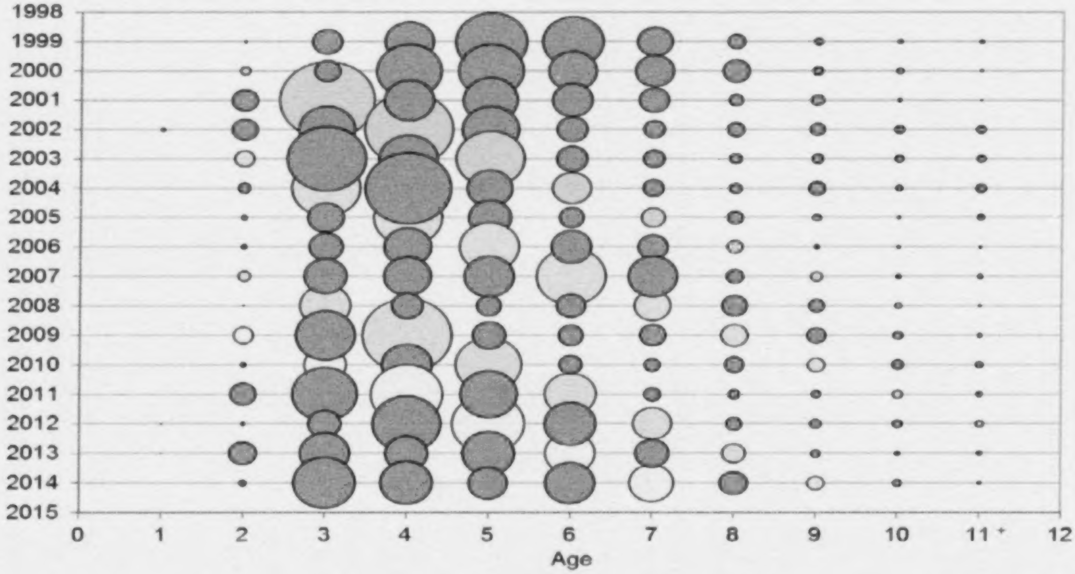


Figure 34A. Acoustic survey relative numbers at age (denoted by circle size) for the overall SWNS/BoF component. Selected year-classes are indicated by colours.

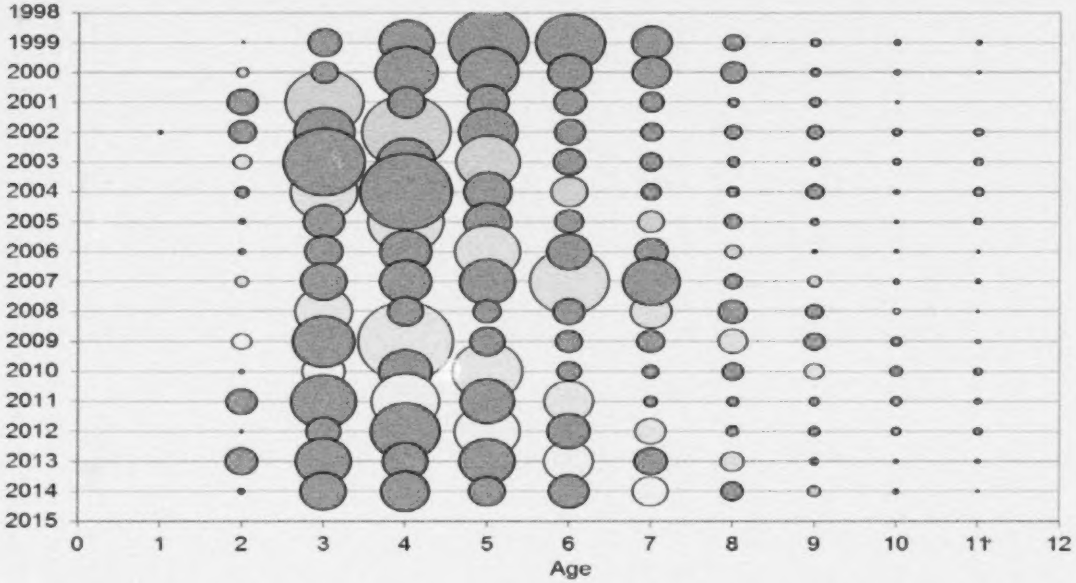


Figure 34B. Acoustic survey relative numbers at age (denoted by circle size) for the German Bank spawning area in the SWNS/BoF component. Selected year-classes are indicated by colours.

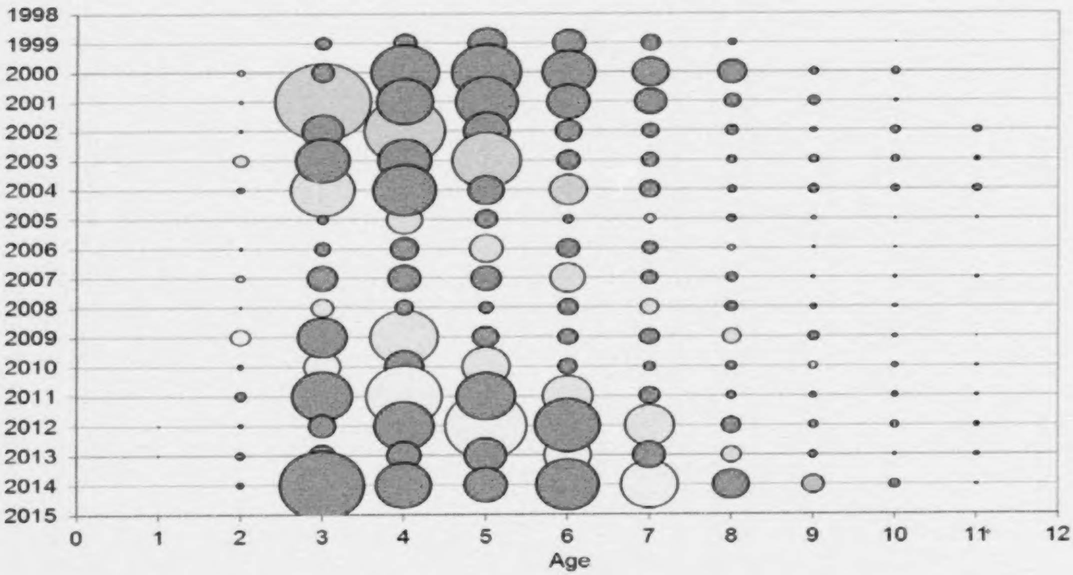


Figure 34C. Acoustic survey relative numbers at age (denoted by circle size) for the Scots Bay spawning area in the SWNS/BoF component. Selected year-classes are indicated by colours.

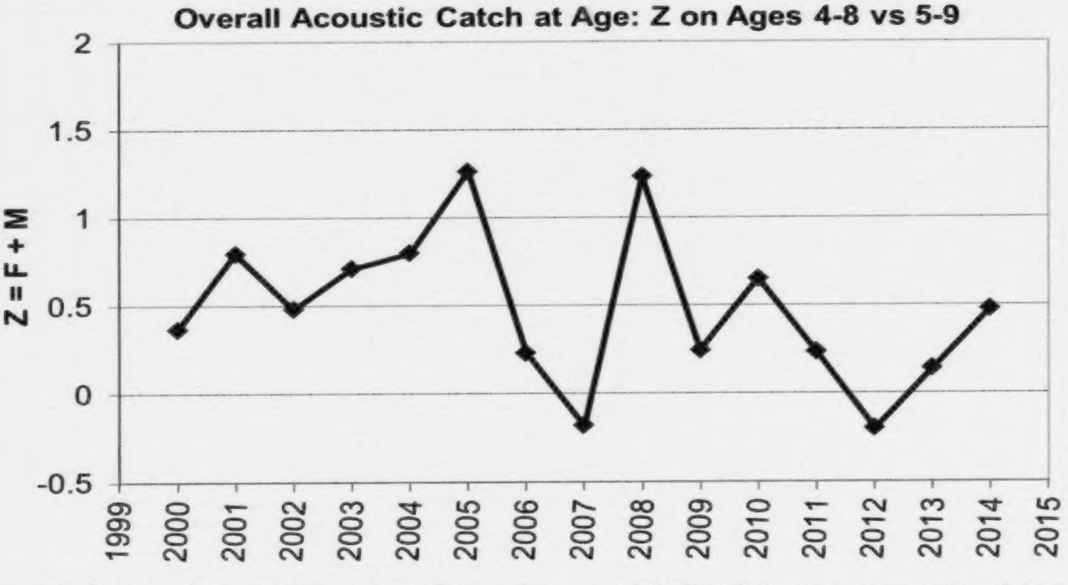


Figure 35A. Total mortality estimates (Z=F+M) from the overall SWNS/BoF component acoustic catch at age data for ages 4 to 8 combined, compared with ages 5 to 9 in the following year.

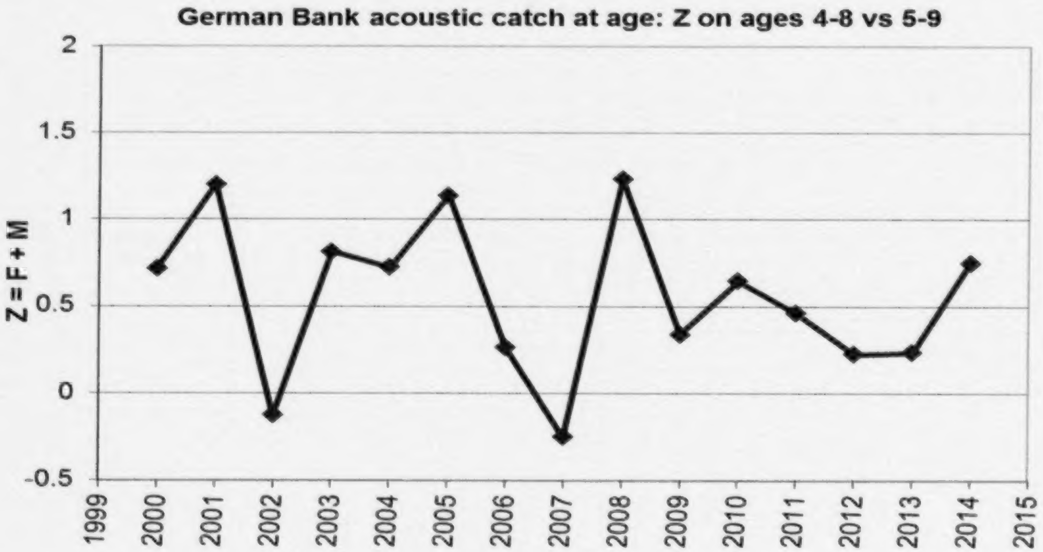


Figure 35B. Total mortality estimates (Z=F+M) for the German Bank spawning area acoustic catch at age data for ages 4 to 8 combined, compared with ages 5 to 9 in the following year.

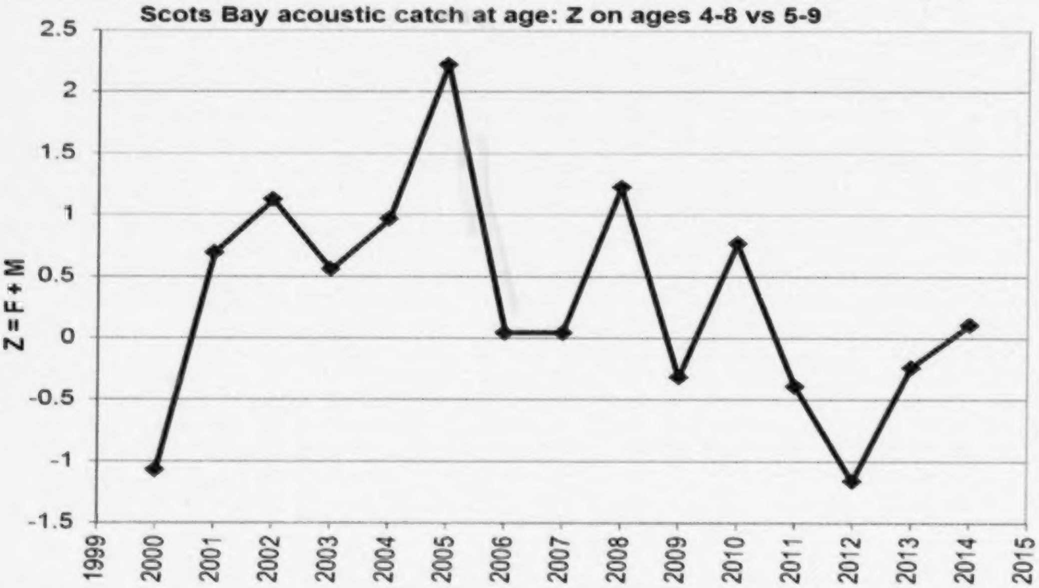


Figure 35C. Total mortality estimates (Z=F+M) for the Scots Bay spawning area acoustic catch at age data for ages 4 to 8 combined, compared with ages 5 to 9 in the following year.

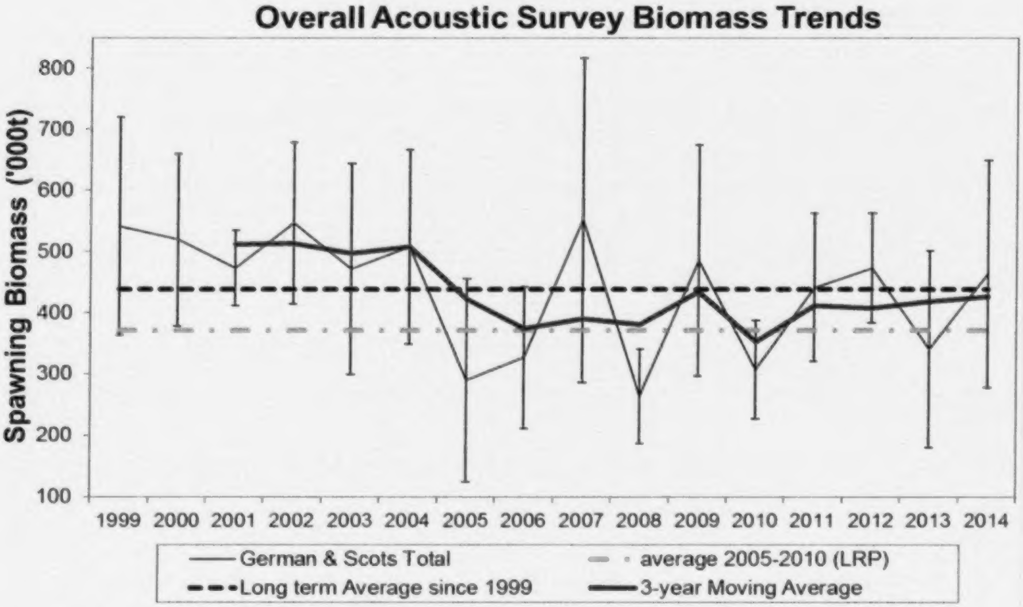


Figure 36A. SSB (thousands t, with 95% standard errors), the three-year moving average, the calculated long term average and the limit reference point (LRP) for the SWNS/BoF spawning component (German Bank and Scots Bay). Biomass estimates calculated with CIF.

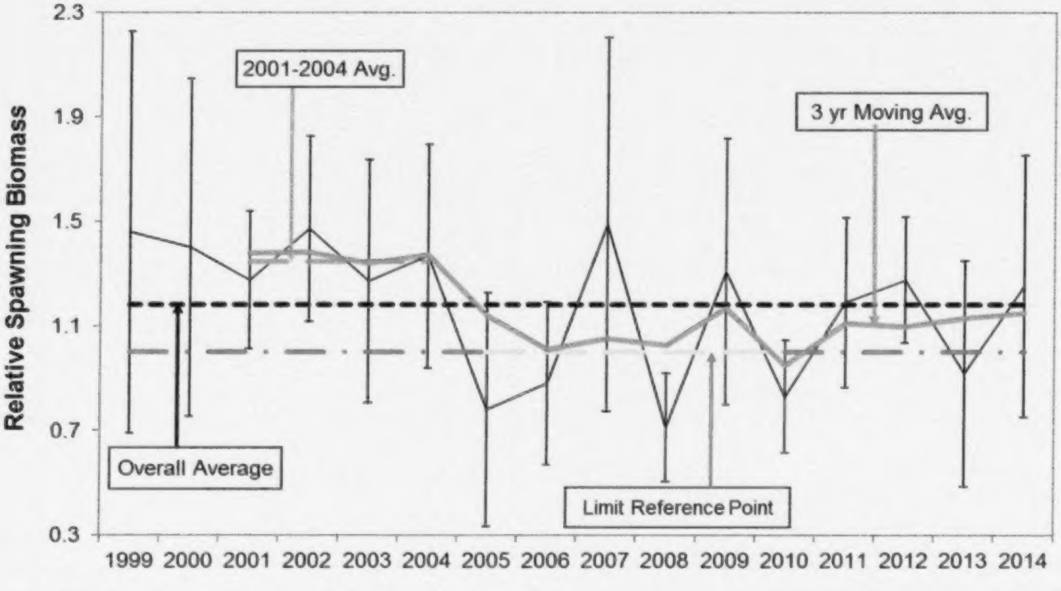


Figure 36B. Relative SSB index (with 95% confidence interval), the calculated three-year moving average, the long term average and the limit reference point for the SWNS/BoF spawning component (German Bank and Scots Bay).

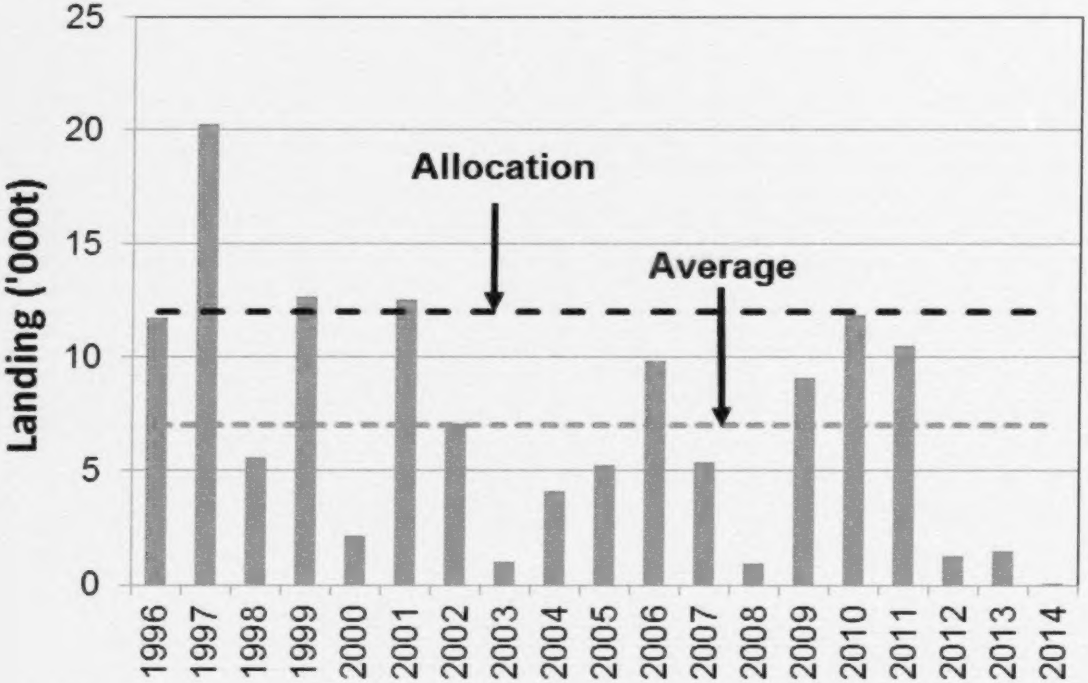


Figure 37. Offshore Scotian Shelf herring landings ('000t) (includes by-catch in other fisheries) since 1996 with the overall average for the period.

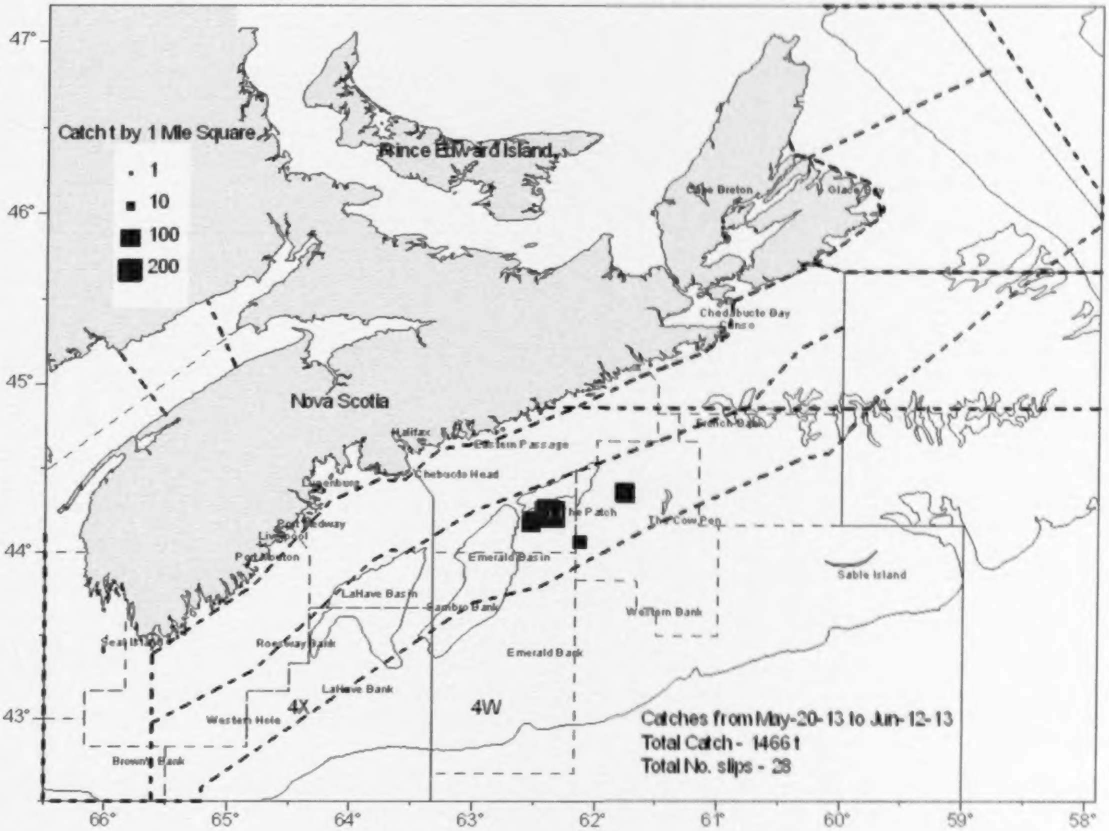

Catch t by 1 Mile Square
1
10
100
200
Prince Edward Island
Nova Scotia
Cape Breton
Glace Bay
Chedabucto Bay
Canso
Halifax
Eastern Passage
Chebucto Head
Lunenburg
Port Medway
Liverpool
Port Mouton
The Patch
The Cow Pen
French Bank
Emerald Basin
LaHave Basin
Sambro Bank
Roseway Bank
Emerald Bank
Western Bank
Sable Island
LaHave Bank
Western Hole
Browns Bank
Seal Island
4X
4W
Catches from May-20-13 to Jun-12-13
Total Catch - 1466 t
Total No. slips - 28
47°
46°
45°
44°
43°
66°
65°
64°
63°
62°
61°
60°
59°
58°

Figure 38A. 2013 herring purse seine landings (t) on the offshore Scotian Shelf banks with embayment and offshore 25- and 50-mile lines shown.

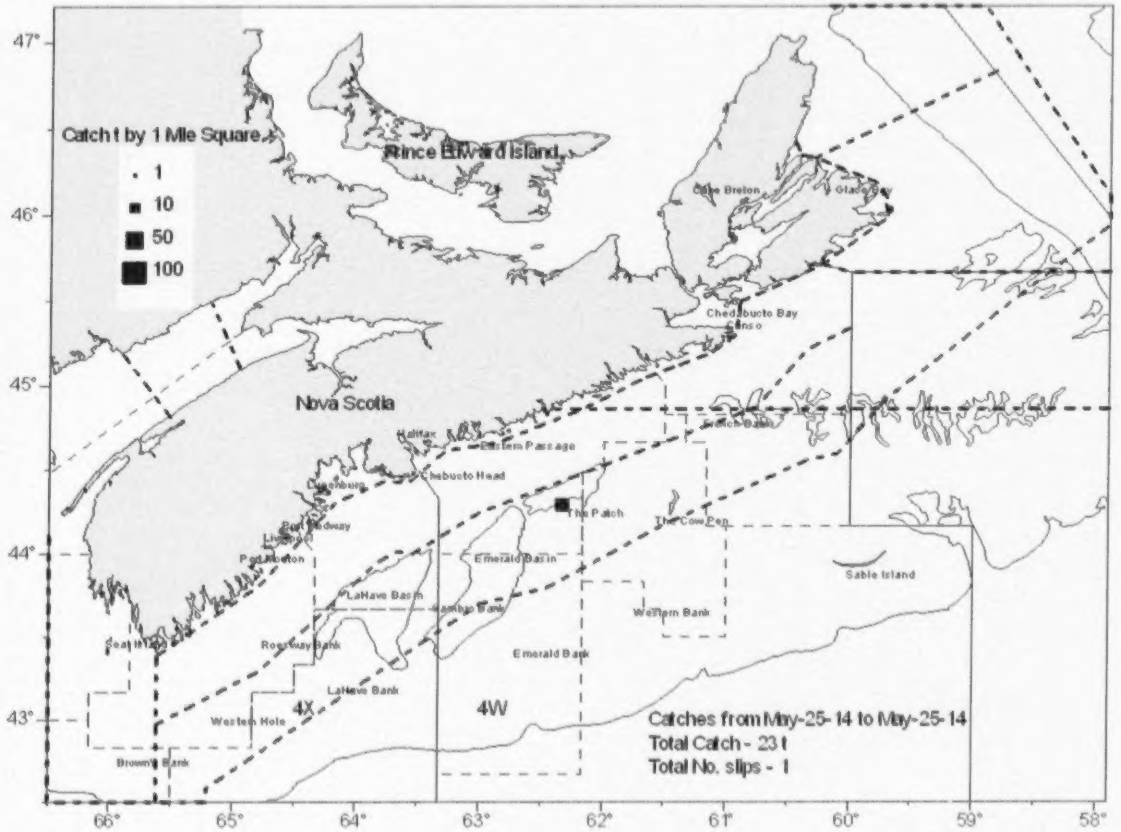

47°
46°
45°
44°
43°
Catch t by 1 Mile Square
1
10
50
100
Prince Edward Island
Cape Breton
Glace Bay
Chedabucto Bay
Canso
Nova Scotia
Halifax
Eastern Passage
Chebucto Head
Lunenburg
Liverpool
Port Mouton
Shelburne
The Patch
The Gully
The Cow Pen
French Bank
Emerald Basin
LaHave Basin
Sambro Bank
Western Bank
Sable Island
Roseway Bank
Emerald Bank
LaHave Bank
Western Hole
4X
4W
Browns Bank
Catches from May-25-14 to May-25-14
Total Catch - 23 t
Total No. slips - 1
66°
65°
64°
63°
62°
61°
60°
59°
58°

Figure 38B. 2014 herring purse seine landings (t) on the offshore Scotian Shelf banks with embayment and offshore 25- and 50-mile lines shown.

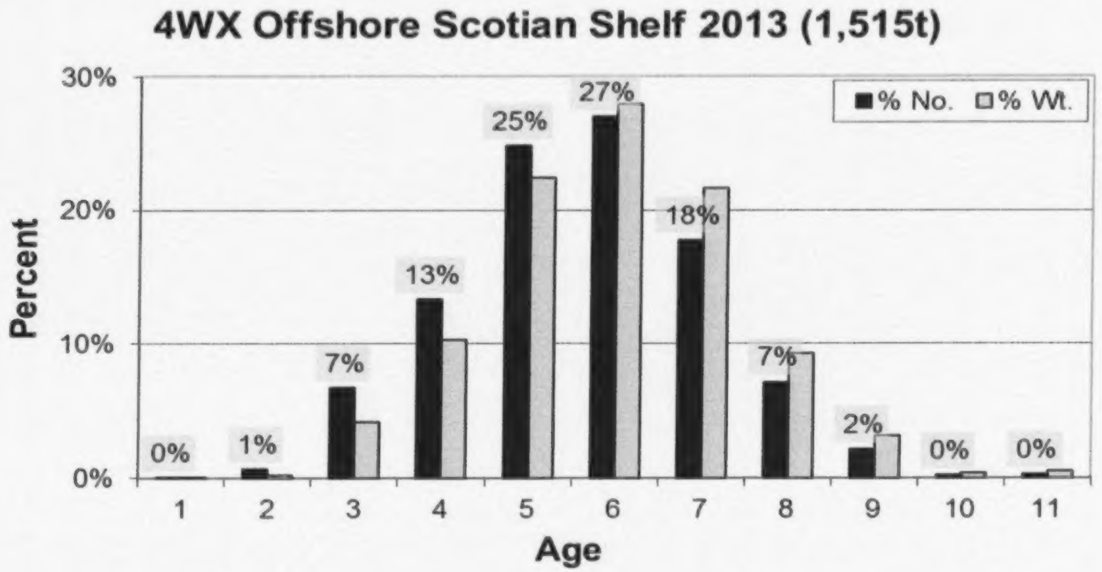


Figure 39A. Fishery catch at age (% numbers and % weight) for the 2013 offshore Scotian Shelf herring component.

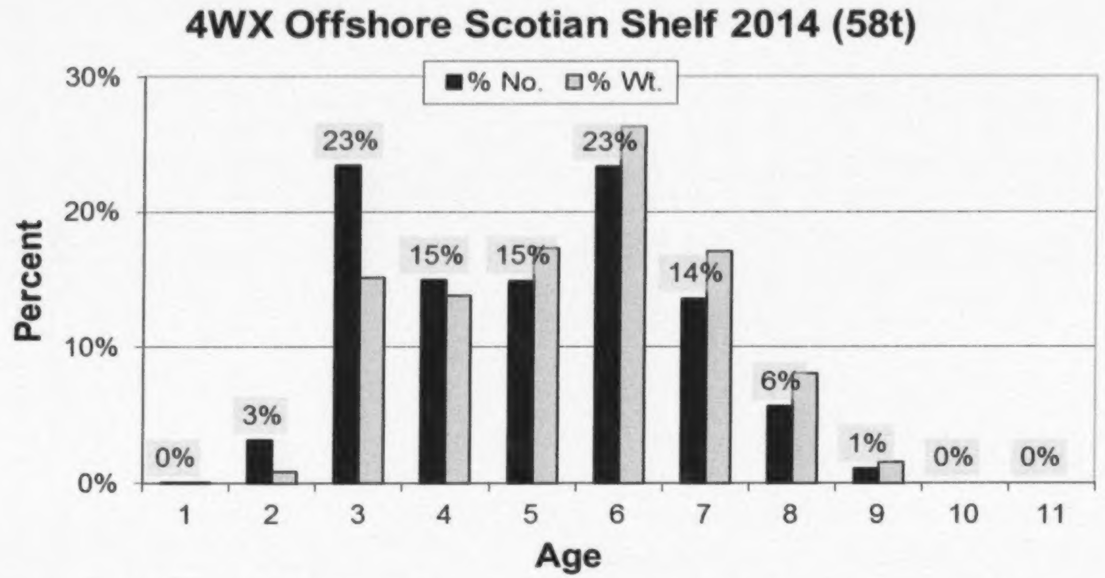


Figure 39B. Fishery catch at age (% numbers and % weight) for the 2014 offshore Scotian Shelf herring component.

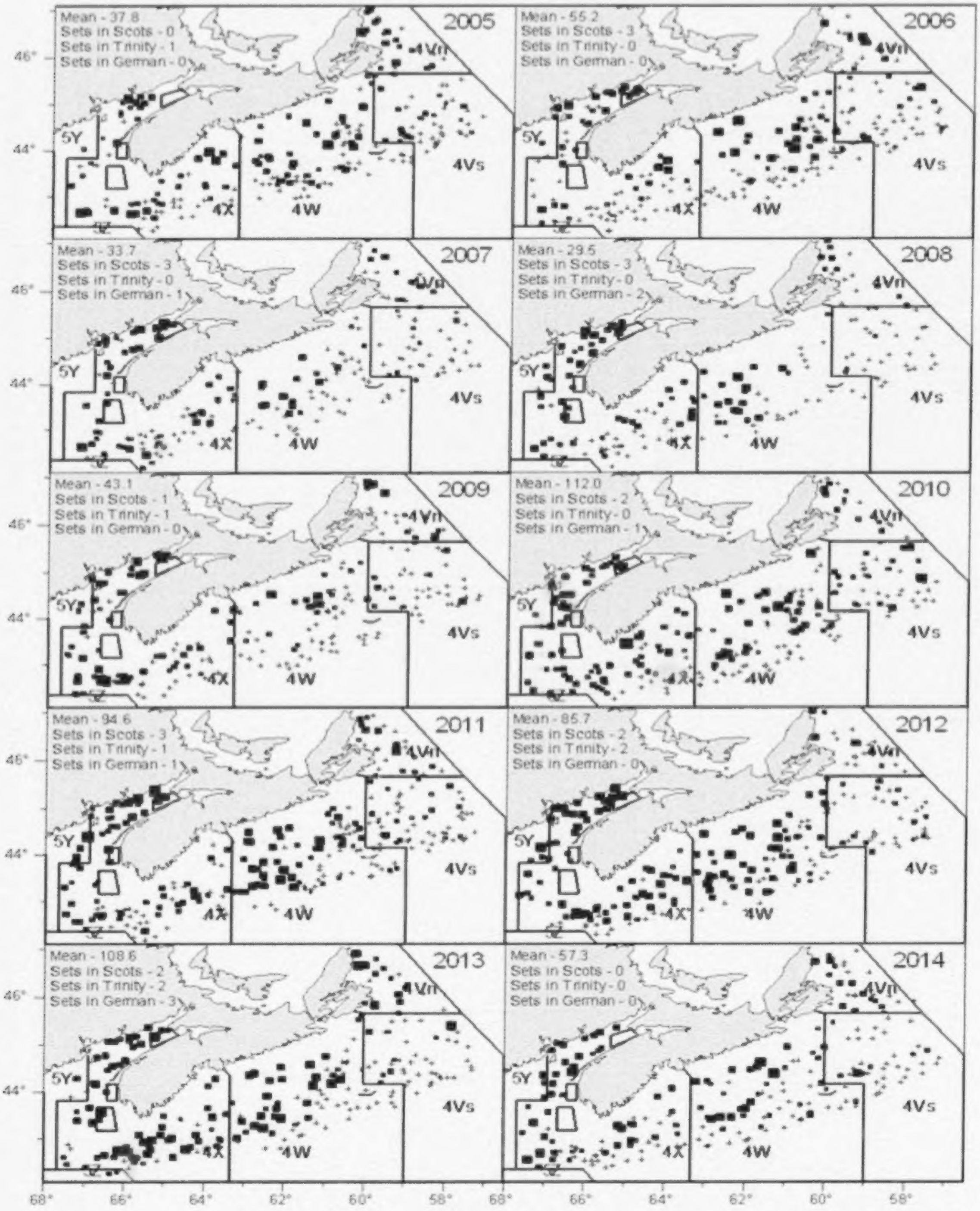

Mean - 37.8
Sets in Scots - 0
Sets in Trinity - 1
Sets in German - 0
2005
Mean - 55.2
Sets in Scots - 3
Sets in Trinity - 0
Sets in German - 0
2006
Mean - 33.7
Sets in Scots - 3
Sets in Trinity - 0
Sets in German - 1
2007
Mean - 29.5
Sets in Scots - 3
Sets in Trinity - 0
Sets in German - 2
2008
Mean - 43.1
Sets in Scots - 1
Sets in Trinity - 1
Sets in German - 0
2009
Mean - 112.0
Sets in Scots - 2
Sets in Trinity - 0
Sets in German - 1
2010
Mean - 94.6
Sets in Scots - 3
Sets in Trinity - 1
Sets in German - 1
2011
Mean - 85.7
Sets in Scots - 2
Sets in Trinity - 2
Sets in German - 0
2012
Mean - 108.6
Sets in Scots - 2
Sets in Trinity - 2
Sets in German - 3
2013
Mean - 57.3
Sets in Scots - 0
Sets in Trinity - 0
Sets in German - 0
2014
4Vn
4Vs
4W
4X
5Y
5Z
46°
44°
68°
66°
64°
62°
60°
58°

Figure 40. Herring catches (by number) from the DFO summer bottom trawl research survey for 2005-2014. Mean numbers per standard tow and count of sets in Scots, Trinity and German spawning areas.

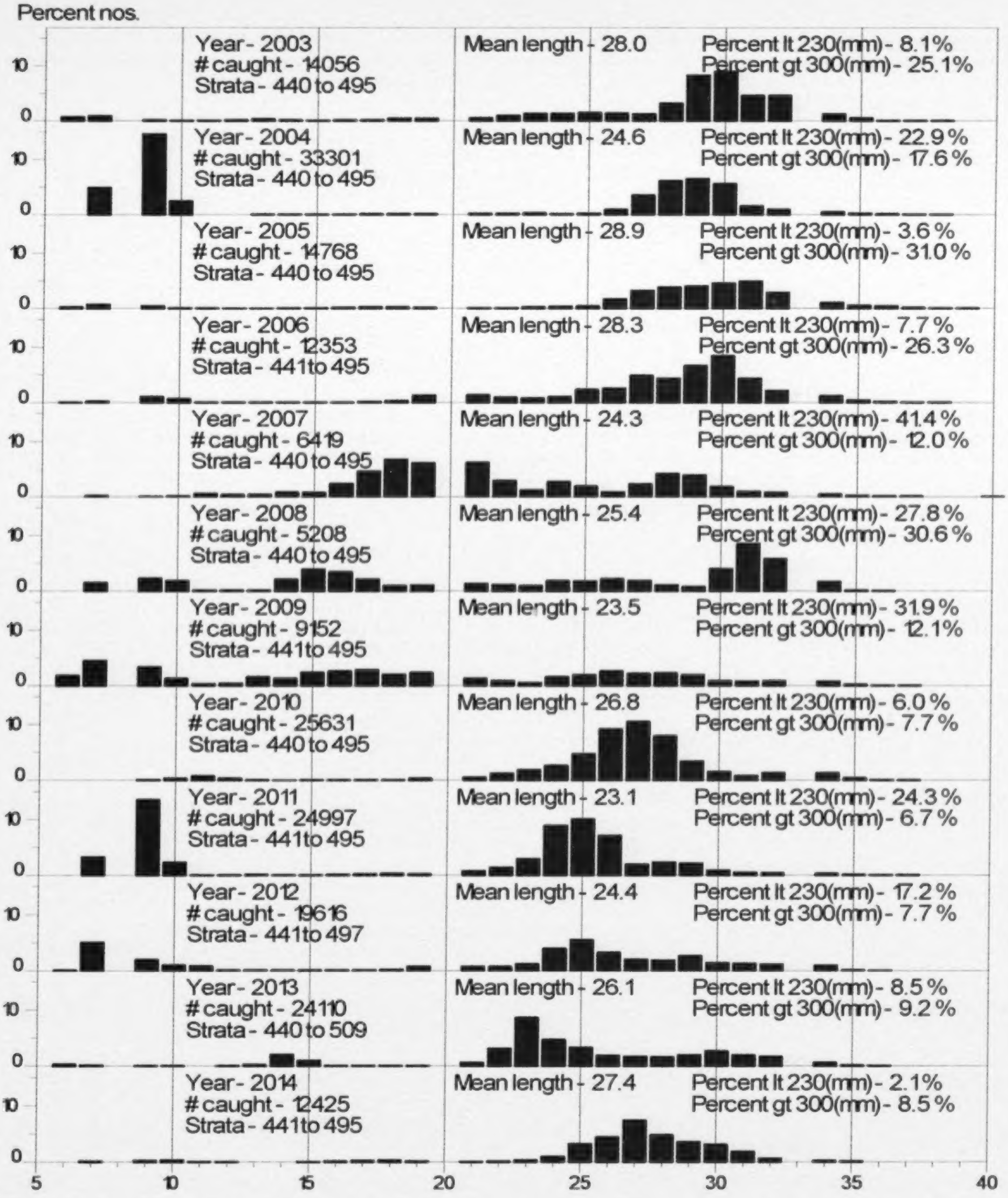


Figure 41. The 2003-2014 herring size distribution (fork length converted to total length cm) from the July bottom trawl research survey for the entire 4VWX area of coverage.

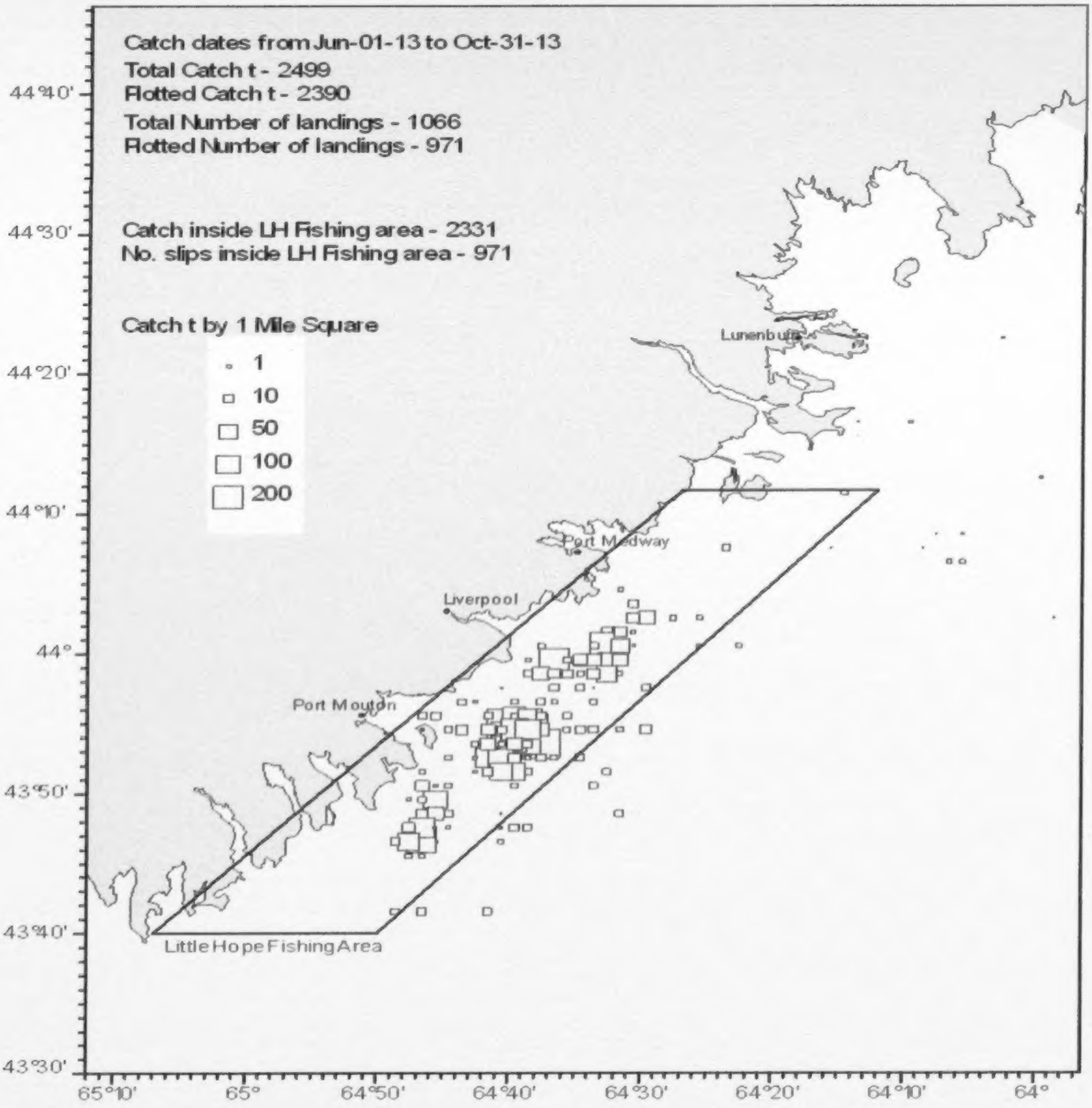

Catch dates from Jun-01-13 to Oct-31-13
Total Catch t - 2499
Plotted Catch t - 2390
Total Number of landings - 1066
Plotted Number of landings - 971
Catch inside LH Fishing area - 2331
No. slips inside LH Fishing area - 971
Catch t by 1 Mile Square
1
10
50
100
200
Lunenburg
Port Medway
Liverpool
Port Mouton
Little Hope Fishing Area
44°40'
44°30'
44°20'
44°10'
44°
43°50'
43°40'
43°30'
65°10'
65°
64°50'
64°40'
64°30'
64°20'
64°10'
64°

Figure 42A. The 2013 herring gillnet catch locations for landings (t) in statistical districts 23-31 with amount caught within the Little Hope Fishing Area.

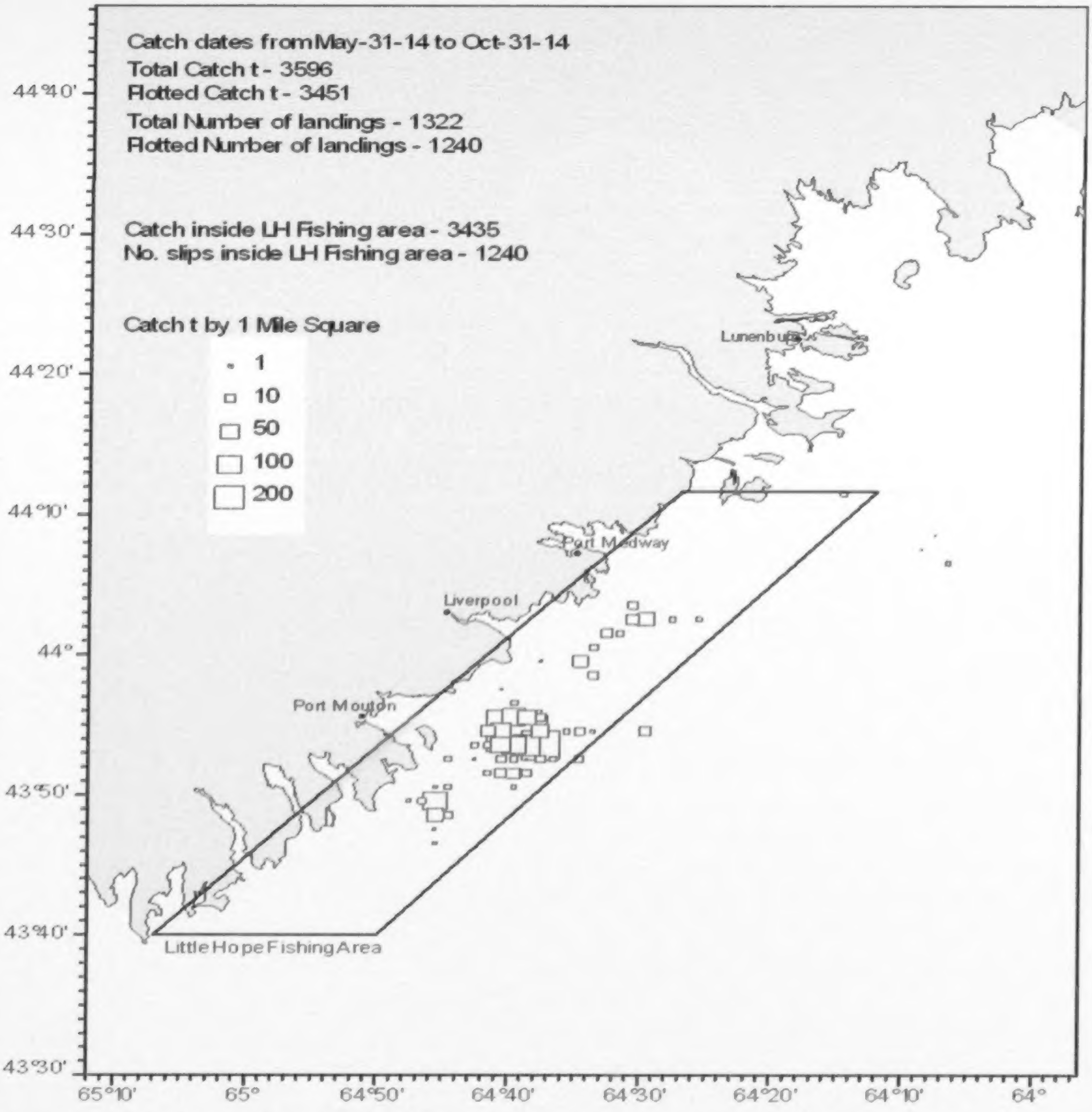

Catch dates from May-31-14 to Oct-31-14
Total Catch t - 3596
Plotted Catch t - 3451
Total Number of landings - 1322
Plotted Number of landings - 1240
Catch inside LH Fishing area - 3435
No. slips inside LH Fishing area - 1240
Catch t by 1 Mile Square
1
10
50
100
200
Lunenburg
Port Medway
Liverpool
Port Mouton
Little Hope Fishing Area
44°40'
44°30'
44°20'
44°10'
44°
43°50'
43°40'
43°30'
65°10'
65°
64°50'
64°40'
64°30'
64°20'
64°10'
64°

Figure 42B. The 2014 herring gillnet catch locations for landings (t) in statistical districts 23-31 with amount caught within the Little Hope Fishing Area.

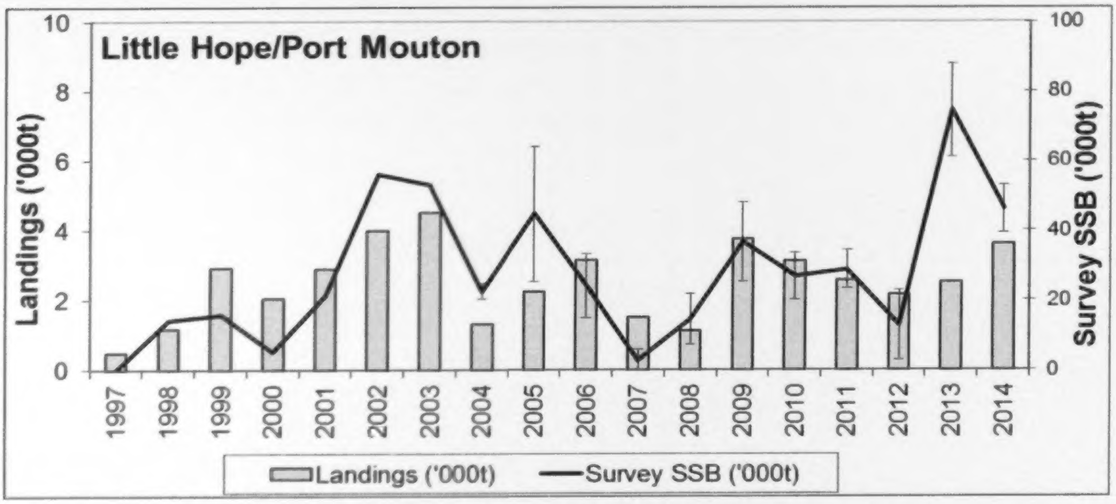


Figure 43. Herring landings ('000t) and acoustic SSB ('000t) with 95% C.I. for the Little Hope/Port Mouton gillnet fishery from 1997-2014. No C.I. could be calculated for years prior to 2004.

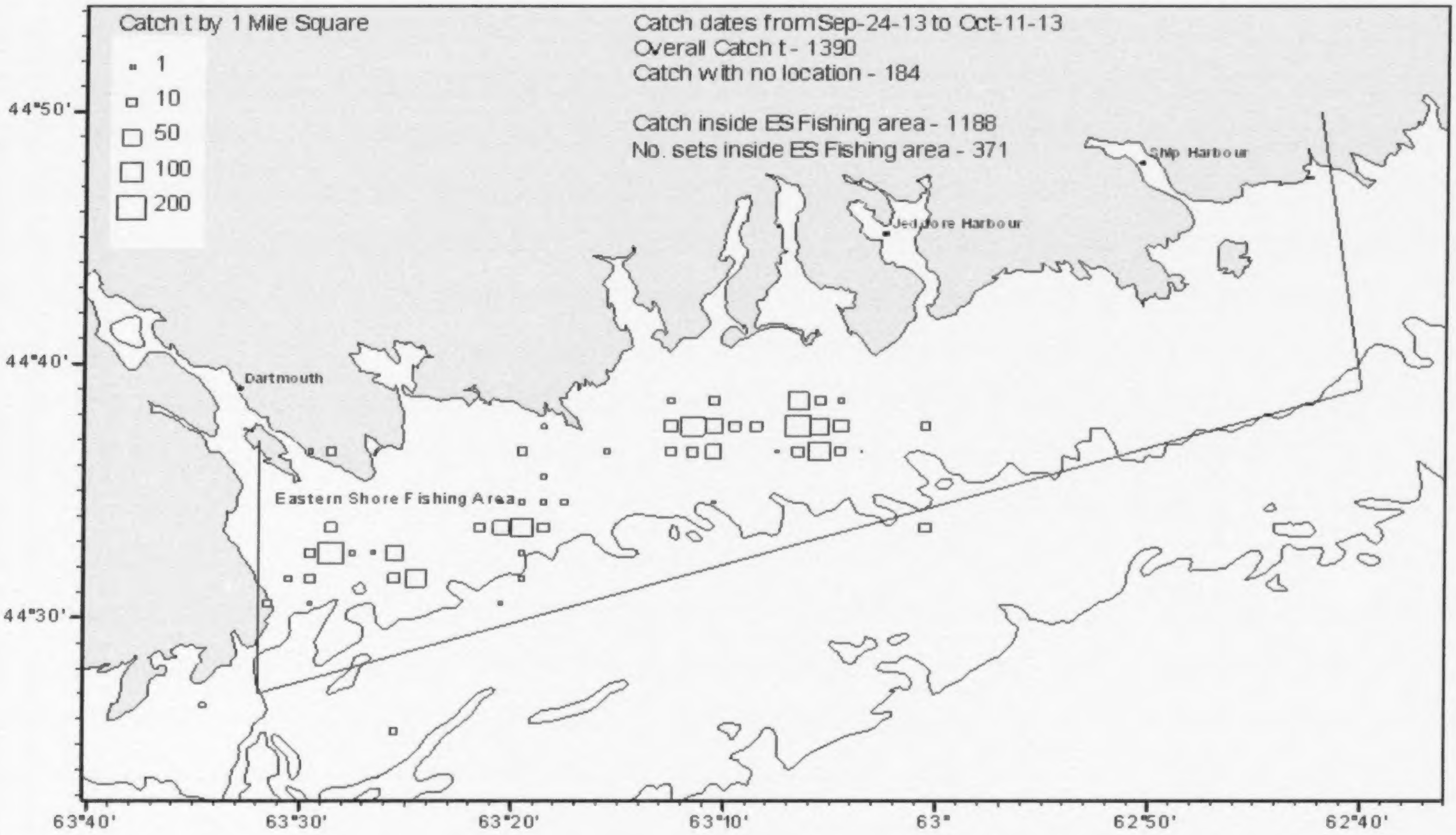

Catch t by 1 Mile Square
1
10
50
100
200
Catch dates from Sep-24-13 to Oct-11-13
Overall Catch t - 1390
Catch with no location - 184
Catch inside ES Fishing area - 1188
No. sets inside ES Fishing area - 371
Ship Harbour
Jeddore Harbour
Dartmouth
Eastern Shore Fishing Area
44°50'
44°40'
44°30'
63°40'
63°30'
63°20'
63°10'
63°
62°50'
62°40'

Figure 44A. Gillnet herring landings (t) for the 2013 fall fishery along the Eastern Shore Fishing Area (landings by 1-mile squares).

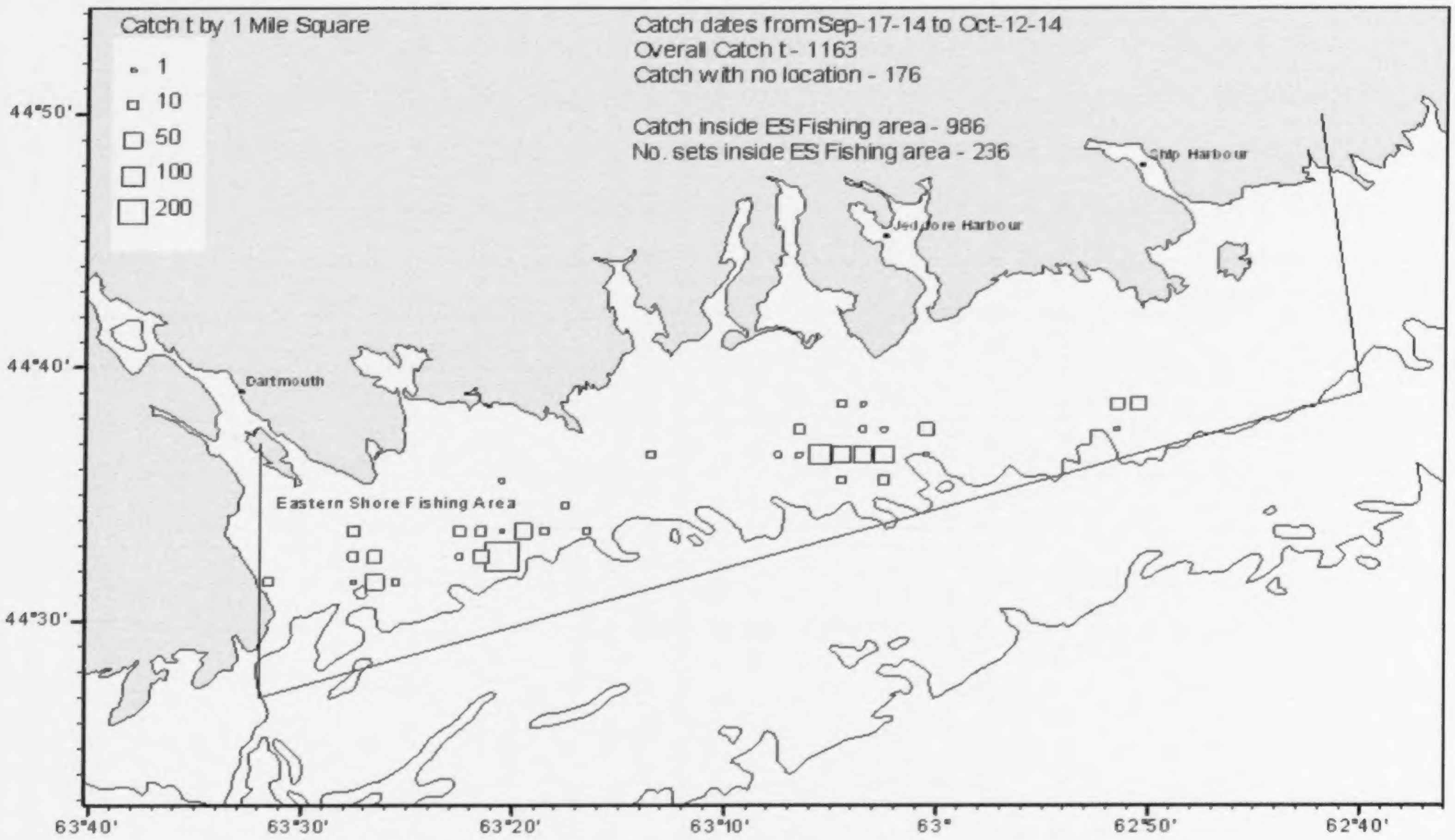

Catch t by 1 Mile Square
1
10
50
100
200
Catch dates from Sep-17-14 to Oct-12-14
Overall Catch t - 1163
Catch with no location - 176
Catch inside ES Fishing area - 986
No. sets inside ES Fishing area - 236
Ship Harbour
Jeddore Harbour
Dartmouth
Eastern Shore Fishing Area
44°50'
44°40'
44°30'
63°40'
63°30'
63°20'
63°10'
63°
62°50'
62°40'

Figure 44B. Gillnet herring landings (t) for the 2014 fall fishery along the Eastern Shore Fishing Area (landings by 1-mile squares).

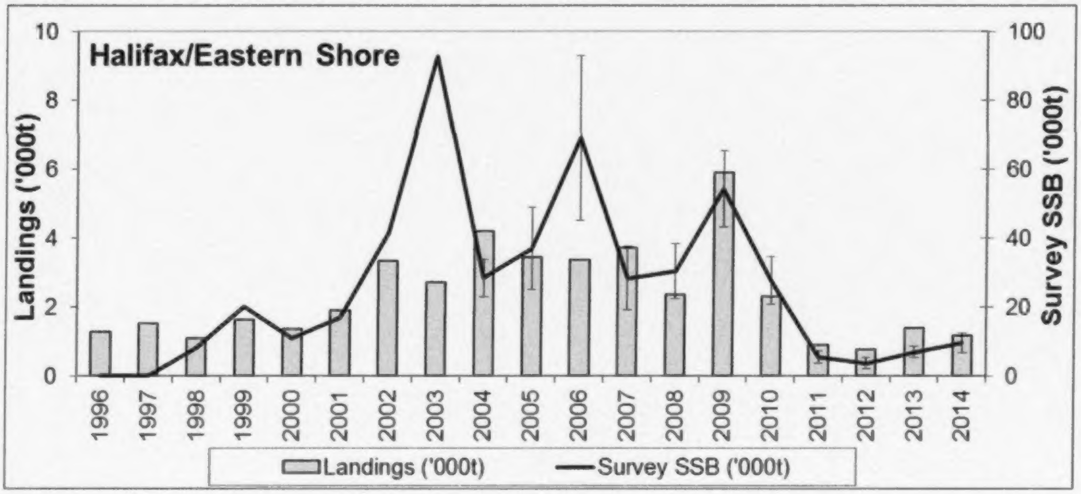


Figure 45. Herring landings ('000t) and acoustic SSB ('000t) with 95% C.I. for the Halifax/Eastern Shore gillnet fishery from 1997-2014. No C.I. could be calculated for years prior to 2004.

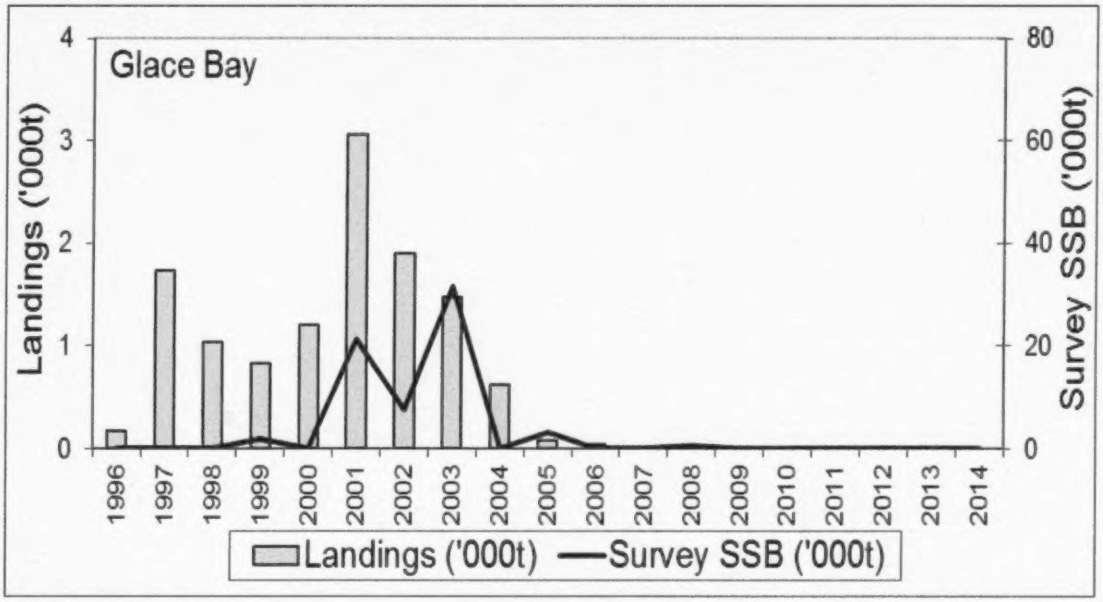


Figure 46. Herring landings ('000t) and acoustic SSB ('000t) for the Glace Bay gillnet fishery from 1997-2014. No C.I. could be calculated due to limited number of surveys.

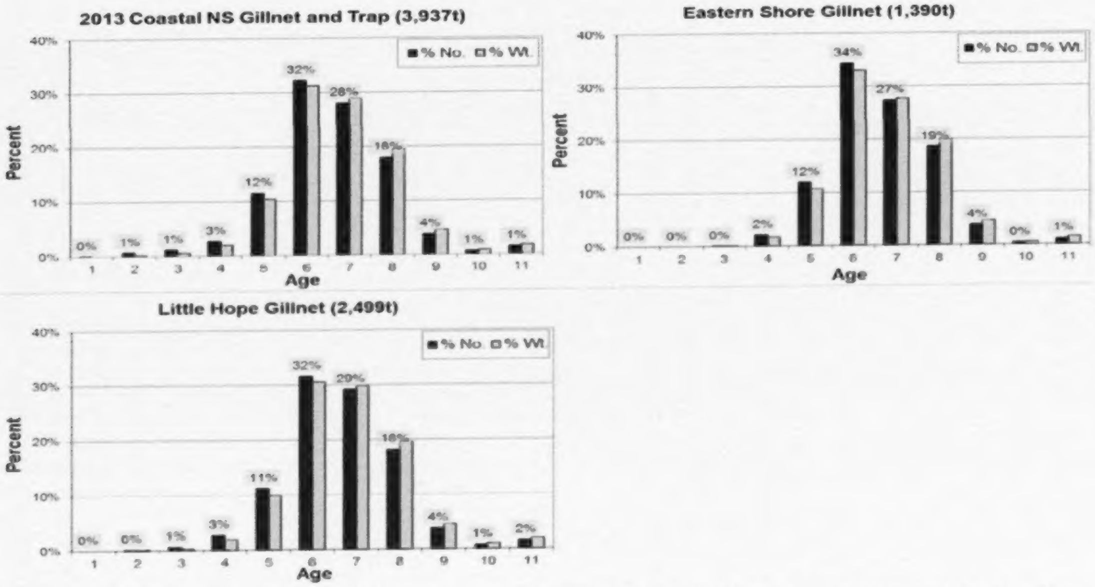


Figure 47A. Fishery catch at age (% numbers and % weight) for the 2013 Coastal Nova Scotia herring gillnet and trap fishery and within the Coastal Nova Scotia component for the Halifax/Eastern Shore area and the Little Hope area.

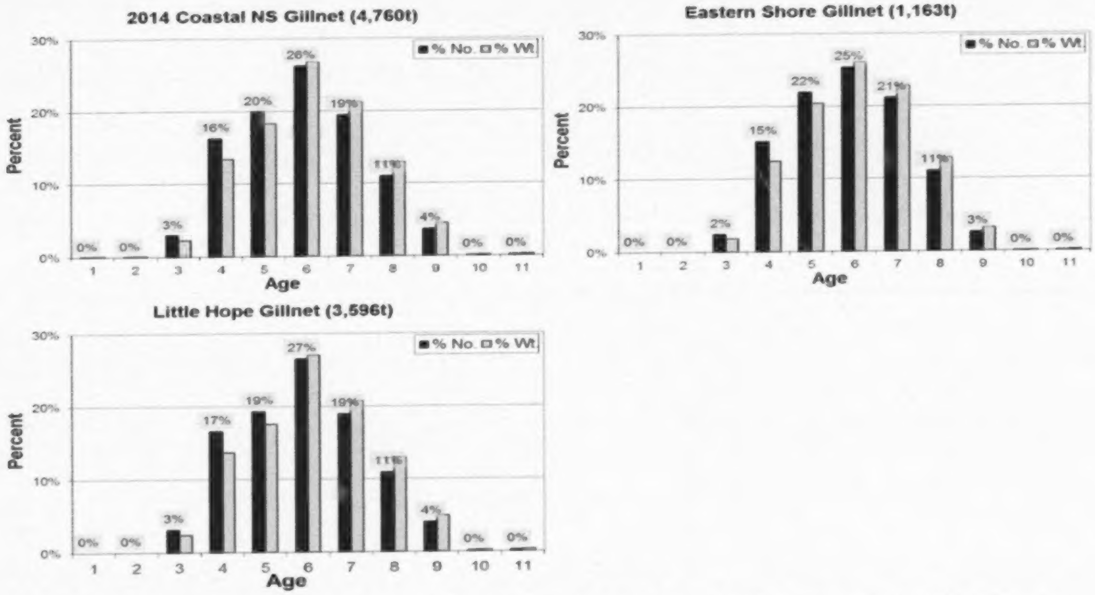


Figure 47B. Fishery catch at age (% numbers and % weight) for the 2014 Coastal Nova Scotia herring gillnet fishery and within the Coastal Nova Scotia component for the Halifax/Eastern Shore area and the Little Hope area. No landings were reported for the trap fishery in 2014.

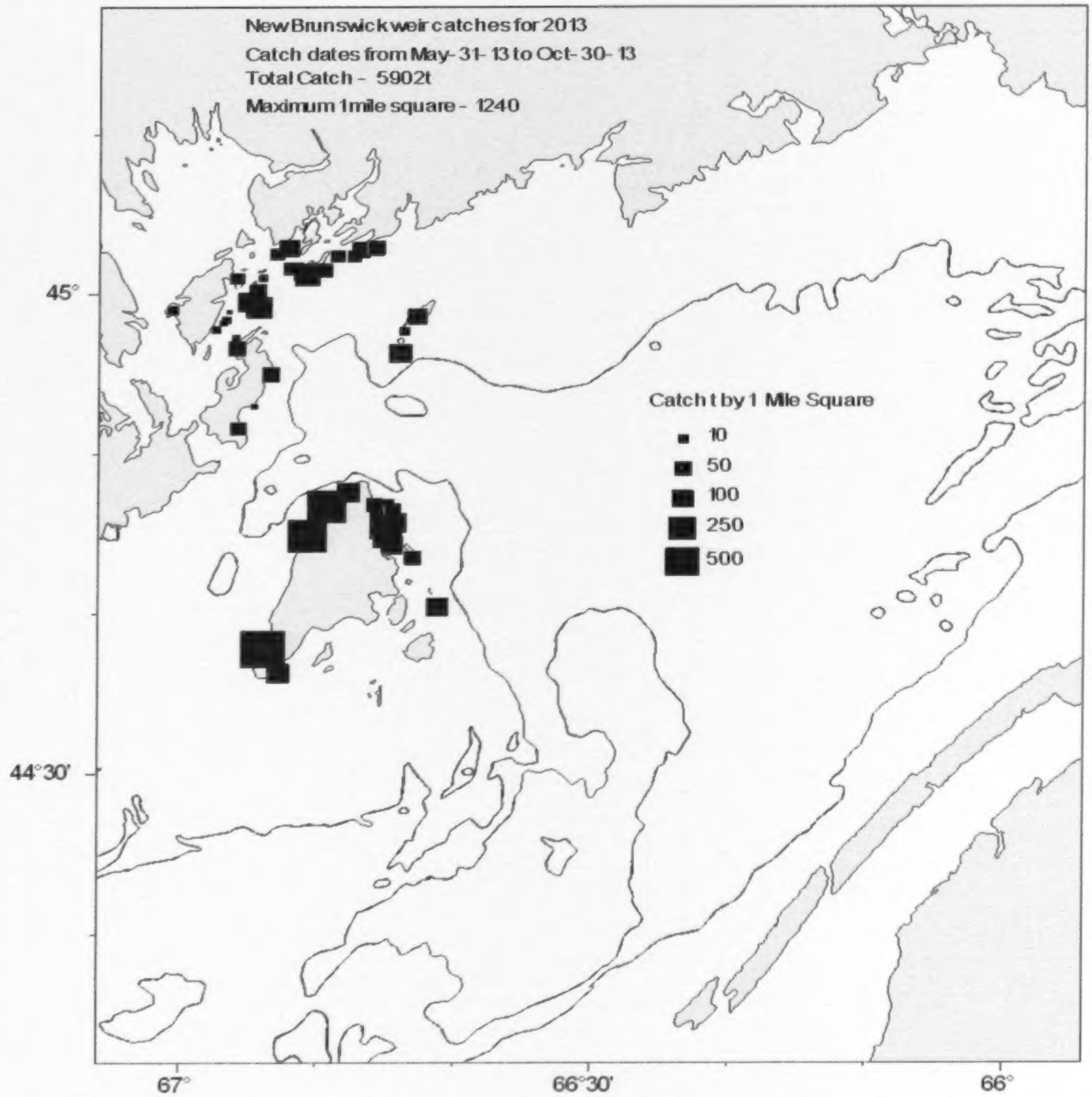

New Brunswick weir catches for 2013
Catch dates from May-31-13 to Oct-30-13
Total Catch - 5902t
Maximum 1 mile square - 1240
Catch t by 1 Mile Square
10
50
100
250
500
45°
44°30'
67°
66°30'
66°

Figure 48A. New Brunswick herring weir landings (t) by location for the 2013 fishing season.

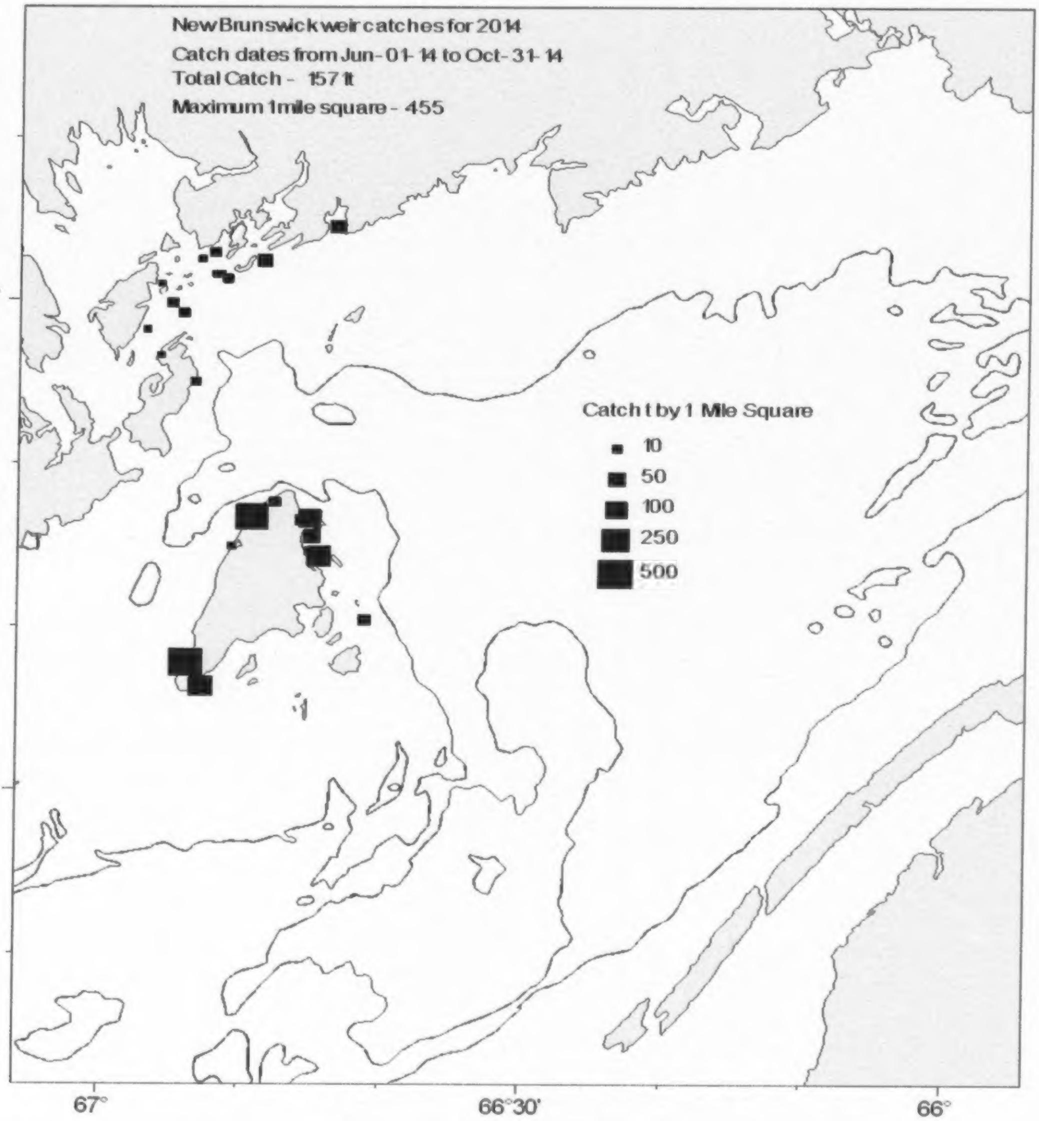

New Brunswick weir catches for 2014
Catch dates from Jun-01-14 to Oct-31-14
Total Catch - 1571 t
Maximum 1mile square - 455
Catch t by 1 Mile Square
10
50
100
250
500
45°
44°30'
67°
66°30'
66°

Figure 48B. New Brunswick herring weir landings (t) by location for the 2014 fishing season.

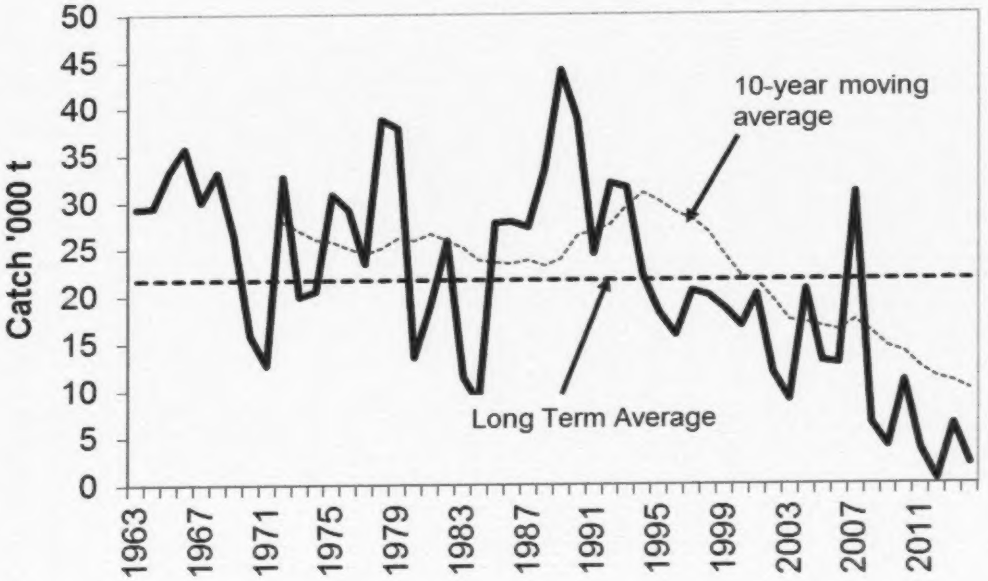


Figure 49. Herring landings ('000t) from the SWNB weir and shutoff fishery for 1963-2014 with long term average and 10-year moving average.

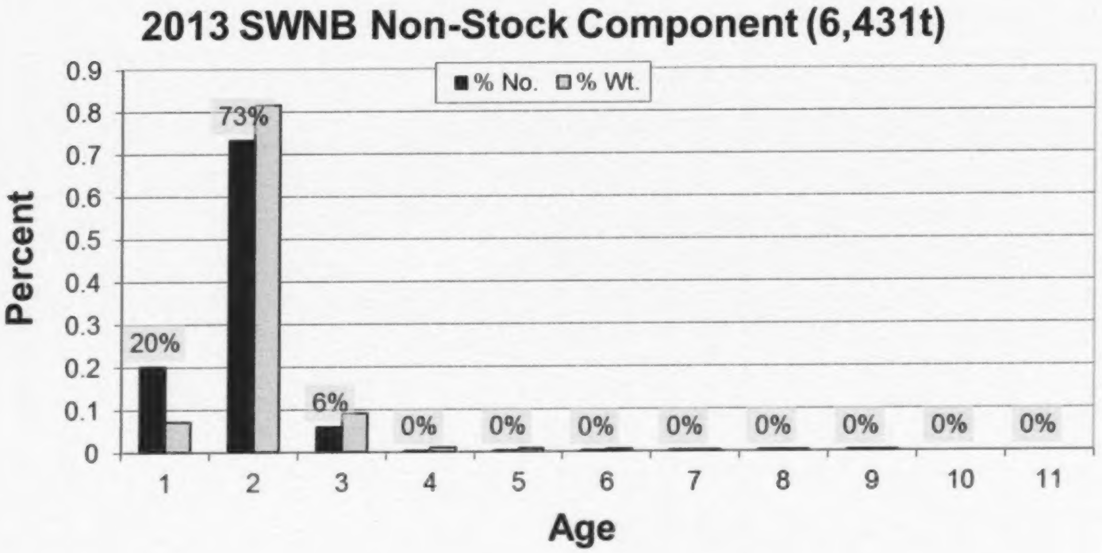


Figure 50A. Fishery catch at age (% numbers and % weight) for the 2013 SWNB migrant juvenile herring component.

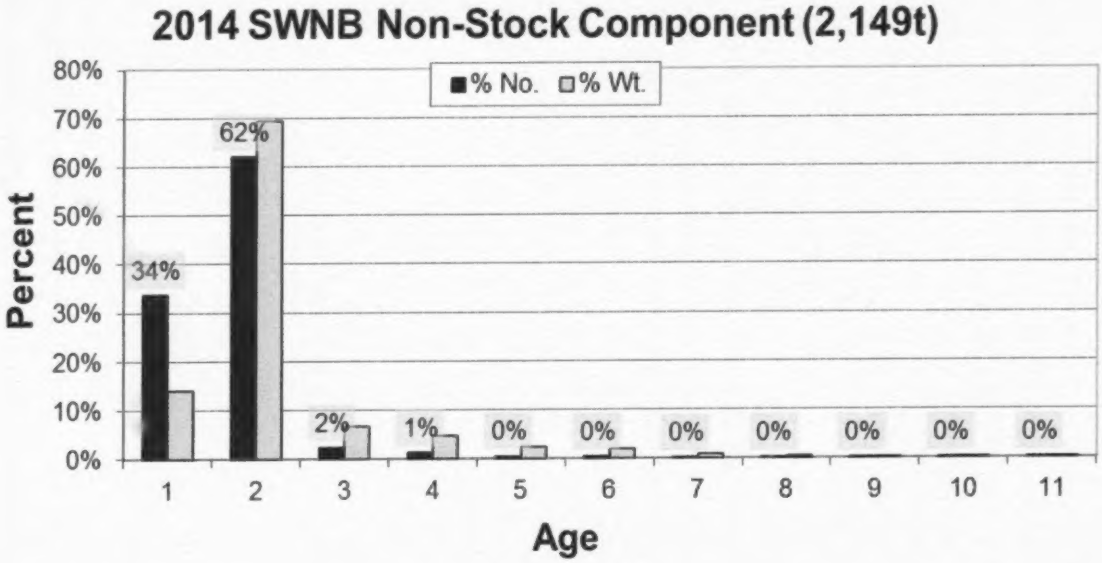


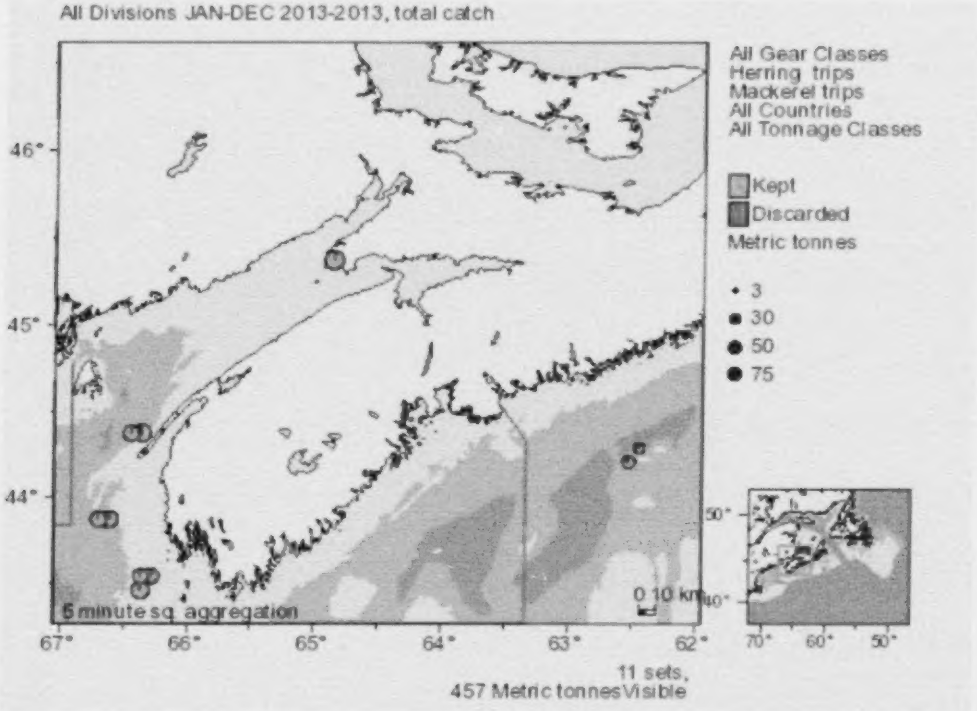
Figure 50B. Fishery catch at age (% numbers and % weight) for the 2014 SWNB migrant juvenile herring component.

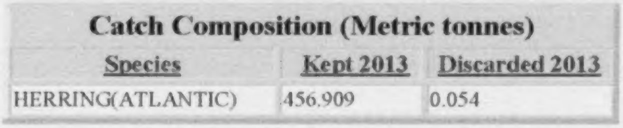
APPENDICES

APPENDIX A: OBSERVER REPORTS FOR HERRING DIRECTED TRIPS FROM 2012-2013 AND 2013-2014

2013 Observer data:

- 9 trips, 11 sets monitored, purse seine gear only
- 2 trips in area 4W (Patch area) in June and rest in 4X during July/August
- Only herring caught


All Divisions JAN-DEC 2013-2013, total catch
All Gear Classes
Herring trips
Mackerel trips
All Countries
All Tonnage Classes
Kept
Discarded
Metric tonnes
3
30
50
75
46°
45°
44°
67°
66°
65°
64°
63°
62°
5 minute sq aggregation
0 10 km
50°
40°
70°
60°
50°
11 sets,
457 Metric tonnes Visible



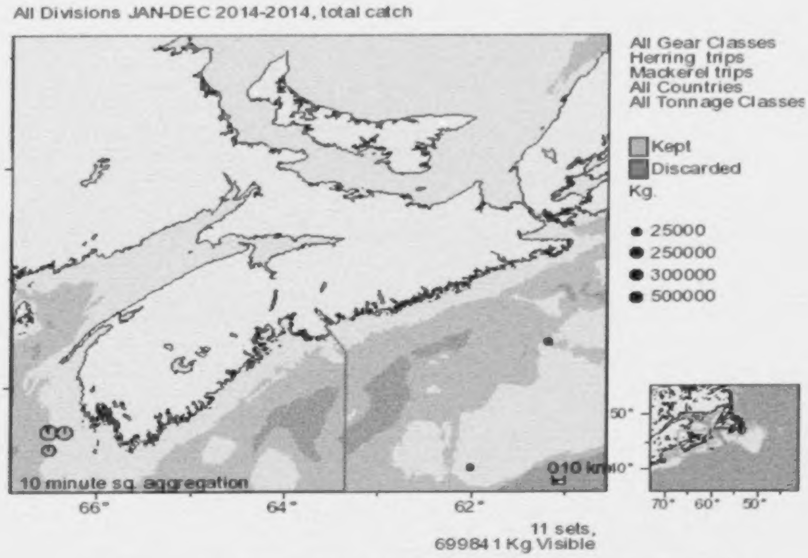
Catch Composition (Metric tonnes)

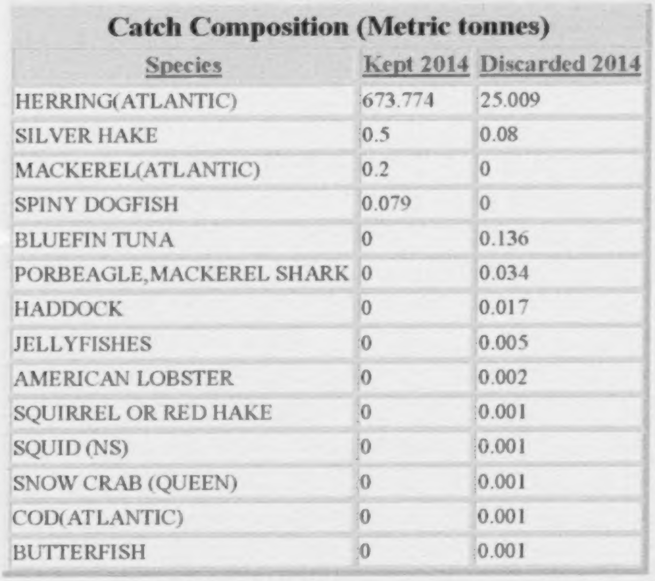
Species	Kept 2013	Discarded 2013
HERRING(ATLANTIC)	456.909	0.054

Figure A1. Species report for 2013 herring and mackerel trips combined.

2014 Observer data:

- 11 trips (14 sets) monitored; purse seine gear and mid-water trawl.
- 9 trips (12 sets) in area 4X in July to October using purse seine gear only.
- 2 trips (2 sets) in area 4W in October/November conducting mid-water trawl.
- By-catch of small amounts of porbeagle – mackerel shark, haddock, jellyfishes, squirrel or red hake, squid (NS), snow crab (queen), cod (Atlantic), butterfish and American lobster were released.
- By-catch of silver hake, mackerel (Atlantic), and spiny dogfish were kept.


All Divisions JAN-DEC 2014-2014, total catch
All Gear Classes
Herring trips
Mackerel trips
All Countries
All Tonnage Classes
Kept
Discarded
Kg.
25000
250000
300000
500000
46°
44°
66°
64°
62°
50°
40°
70°
60°
50°
10 minute sq. aggregation
010 km
11 sets,
699841 Kg Visible



Catch Composition (Metric tonnes)		
Species	Kept 2014	Discarded 2014
HERRING(ATLANTIC)	673.774	25.009
SILVER HAKE	0.5	0.08
MACKEREL(ATLANTIC)	0.2	0
SPINY DOGFISH	0.079	0
BLUEFIN TUNA	0	0.136
PORBEAGLE,MACKEREL SHARK	0	0.034
HADDOCK	0	0.017
JELLYFISHES	0	0.005
AMERICAN LOBSTER	0	0.002
SQUIRREL OR RED HAKE	0	0.001
SQUID (NS)	0	0.001
SNOW CRAB (QUEEN)	0	0.001
COD(ATLANTIC)	0	0.001
BUTTERFISH	0	0.001

Figure A2. Species report for 2014 herring and mackerel trips combined.

APPENDIX B: 2013 AND 2014 AGEING AGREEMENT TESTING

Herring 2013 all
DK1 vs DK2
(D = Prod Age)

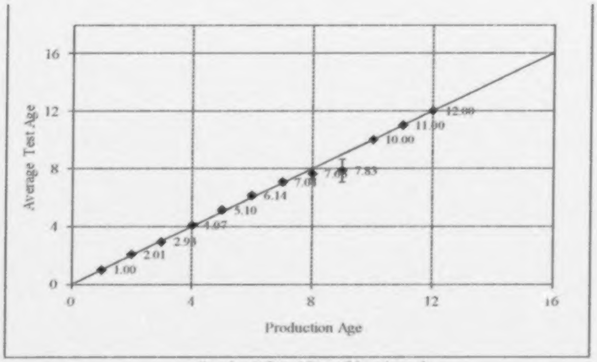
Species: Herring
Date: Herring 2013 all
Age Reader: DK1 vs DK2

				Bowker's test	
N Aged	523	Total CV	2.19%	Chi-sq	11.57
N Agreed	448			d.f.	13
Disagreed	75	%Agreement	85.7%	P-value	0.56
					n/s

Prod Age	N	N Agreed	%Agrmnt	Ave Age	s.d.	C.I.	95% C.I.	
0			#DIV/0!	0.00		####	#NUM!	#NUM!
1	4	4	100%	1.00		####	#NUM!	#NUM!
2	137	135	99%	2.01	0.12	0.02	1.99	2.03
3	85	79	93%	2.93	0.26	0.05	2.87	2.98
4	45	40	89%	4.07	0.33	0.10	3.97	4.16
5	83	72	87%	5.10	0.40	0.09	5.01	5.18
6	80	57	71%	6.14	0.67	0.15	5.99	6.28
7	50	36	72%	7.04	0.64	0.18	6.86	7.22
8	29	19	66%	7.66	0.97	0.35	7.30	8.01
9	6	2	33%	7.83	0.98	0.79	7.05	8.62
10	2	2	100%	10.00		####	#NUM!	#NUM!
11	1	1	100%	11.00	#DIV/0!	####	#DIV/0!	#DIV/0!
12	1	1	100%	12.00	#DIV/0!	####	#DIV/0!	#DIV/0!
13			#DIV/0!			####	#NUM!	#NUM!
14			#DIV/0!			####	#NUM!	#NUM!
15			#DIV/0!			####	#NUM!	#NUM!
16			#DIV/0!			####	#NUM!	#NUM!
Total	523	448						

Omitted Samples

Prod Age	Test Age
NONE	



Error bars indicate 95% confidence intervals

	Test Age																	
Prod Age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
0																		
1		4																4
2			135	2														137
3			6	79														85
4				1	40	4												45
5					2	72	8	1										83
6						8	57	12	2	1								80
7						1	5	36	7	1								50
8						1	3	4	19	1	1							29
9								3	1	2								6
10											2							2
11												1						1
12													1					1
13																		
14																		
15																		
16																		
Total		4	141	82	42	86	73	56	29	5	3	1	1					523

Figure B1. Primary ager against self on a random selection of all survey and commercial otoliths collected in 2013.

all combined 2014
DK1 vs DK2
(D = Prod Age)

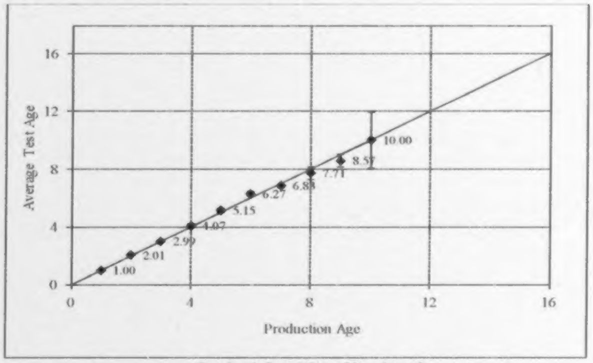
Species Herring
Date all combined 2014
Age Reader DK1 vs DK2

				Bowker's test	
N Aged	661	Total CV	2.19%	Chi-sq	18.67
N Agreed	557			d.f.	14
Disagreed	104	%Agreement	84.3%	P-value	0.18
					n/s

Prod Age	N	N Agreed	%Agrmnt	Ave Age	s.d.	C.I.	95% C.I.	
0			#DIV/0!	0.00		####	#NUM!	#NUM!
1	13	13	100%	1.00		####	#NUM!	#NUM!
2	147	145	99%	2.01	0.12	0.02	1.99	2.03
3	155	150	97%	2.99	0.18	0.03	2.97	3.02
4	83	70	84%	4.07	0.44	0.09	3.98	4.17
5	55	39	71%	5.15	0.52	0.14	5.01	5.28
6	93	62	67%	6.27	0.65	0.13	6.14	6.40
7	75	57	76%	6.83	0.50	0.11	6.71	6.94
8	17	11	65%	7.71	0.92	0.44	7.27	8.14
9	21	10	48%	8.57	1.08	0.46	8.11	9.03
10	2		0%	10.00	1.41	1.96	8.04	11.96
11			#DIV/0!			####	#NUM!	#NUM!
12			#DIV/0!			####	#NUM!	#NUM!
13			#DIV/0!			####	#NUM!	#NUM!
14			#DIV/0!			####	#NUM!	#NUM!
15			#DIV/0!			####	#NUM!	#NUM!
16			#DIV/0!			####	#NUM!	#NUM!
Total	661	557						

Omitted Samples

Prod Age	Test Age
NONE	



Error bars indicate 95% confidence intervals

Prod Age \ Test Age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
0																		
1		13																13
2			145	2														147
3			3	150	2													155
4				4	70	8	1											83
5					4	39	12											55
6						5	62	23	2	1								93
7							16	57	1	1								75
8							2	3	11		1							17
9							2		6	10	3							21
10										1		1						2
11																		
12																		
13																		
14																		
15																		
16																		
Total		13	148	156	76	52	95	83	20	13	4	1						661

Figure B2. Primary ager against self on a random selection of all survey and commercial otoliths collected in 2014.